for . . .

engineers and contractors controlling the design, specification, installation and maintenance of heating, ventilating and air conditioning.

HEATING & VENTILATING

AIR CONDITIONING

PUBLISHER

THE INDUSTRIAL PRESS

President
ROBERT B. LUCHARS

Vice-President and Treasurer
EDGAR A. BECKER

Secretary
ERIK OBERG

EDITORIAL STAFF

Editor
CLIFFORD STROCK

Associate Editor
JOSEPH F. KERN, JR.

Contributing Editor
C. H. B. HOTCHKISS

PUBLISHING INFORMATION

HEATING & VENTILATING is published monthly by the Industrial Press at 148 Lafayette Street, New York, N. Y. Western office, 228 North La Salle Street, Chicago, Ill. Yearly subscription in the United States, Spain, South America, Mexico, and Canada, $2.00; in all other countries, $3.00. Single copies 30 cents.

REPRESENTATIVES

Eastern Representative
ALGWYNNE COLLINS
148 Lafayette Street
New York, N. Y.

Western Representative
GEORGE G. TURNER
228 North La Salle Street
Chicago, Ill.

Copyright, 1940 by The Industrial Press

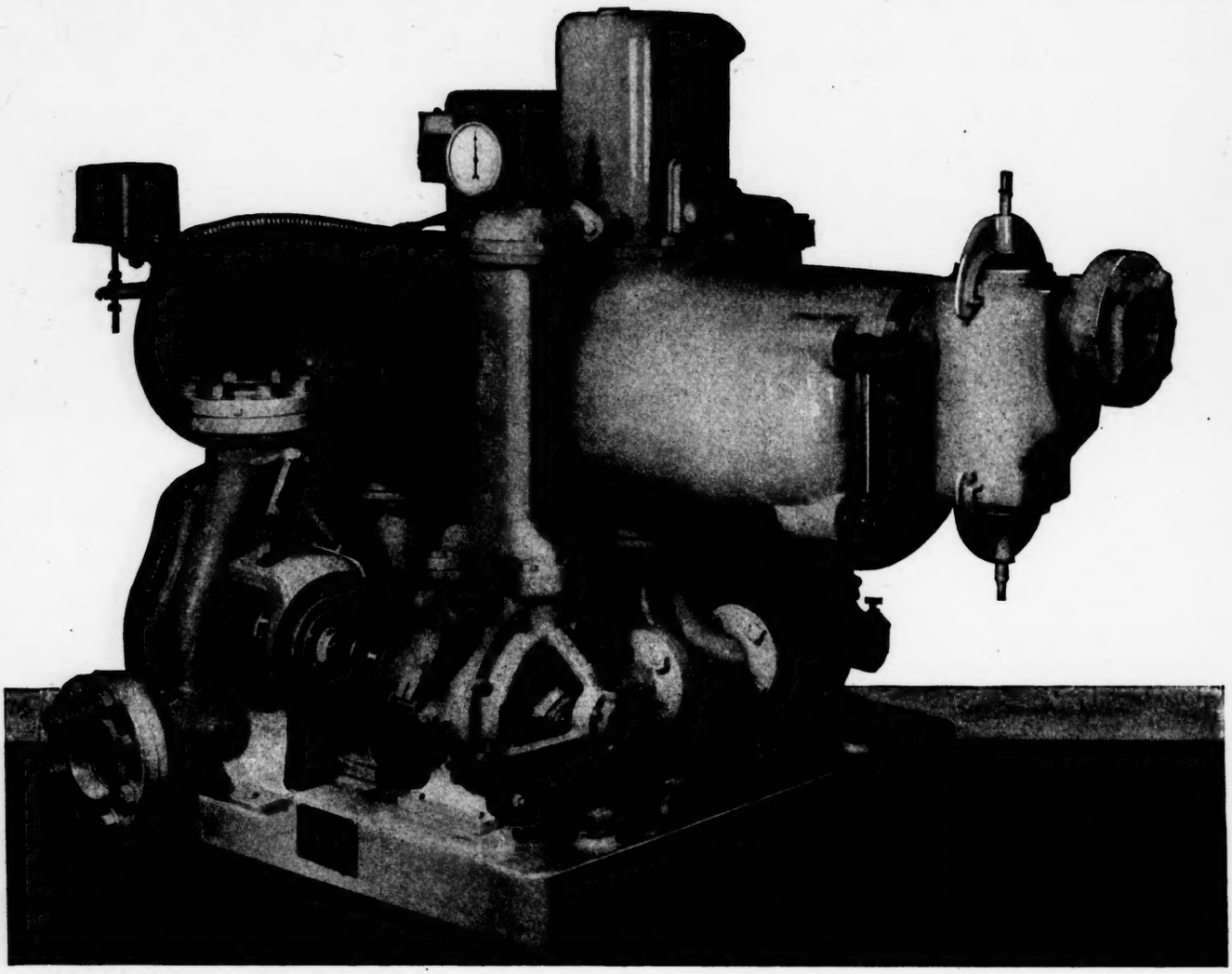
CONTENTS FOR DECEMBER, 1940

VOLUME 37 NUMBER 12

Heating Business in Defense Industry Buildings	11
Unit Heaters Warm Glass Gas Station	15
Simple Chart for Air Conditioning Problems	16
Heat from Radio Tubes Warms WBZ	20
Profits in Air—Durkee-Mower, Inc.	21
Profits in Air—E. R. Squibb and Sons	24
Reactions of Animals to Air Conditions	28
Freezing of Water Pipes	32
How Anthracite Stokers Should be Installed	33
Welding Fume Control and Hood Design Discussed	37
Infiltration	38
A Handy Clamp for Aligning Pipe	39
Dust Control with Low Resistance Systems—Part 3	40
Air Dilution in Industrial Ventilation	42
Water Heating Trouble Job	46
Reference Data, 187 and 188	46
Radiator Heat Test House	47
Ammonia Air Conditioning Plant Cools a Gold Mine	48
How to Determine Size and Cost of Freon Lines	49
Instruments for Measuring Comfort Conditions	51
Number of Degree-Days for October, 1940	52
Abstracts	53
News of the Month	54
New Equipment	62
New Trade Literature	66
With the Manufacturers	67
Coming Events	68
H & V's Photos	68

MEMBER
Audit Bureau of Circulation
Associated Business Papers

Where heat must *Not* fail... install this SAFE *Heating Pump*



In Hospitals, Greenhouses, Schools, Public Buildings, Theatres, wherever heating systems must not fail, install the Nash Vapor Turbine, for it is independent of electric current failure, and continues to operate as long as there is steam in the system. This is because the prime motive power of this economical pump is a special steam turbine, controlled by a unique "Vapor Turbine Valve", which automatically by-passes from the heating main a small portion of steam, the exact amount necessary to develop the power needed to remove the condensate and maintain the required vacuum on the system. Even this small amount is passed immediately back to the mains, and goes on to the system with little heat loss. This pump operates on any system, high or low pressure. The Vapor Turbine is a most economical pump, for the elimination of electric current does away with current cost, the largest single item in the operation of an ordinary return line heating pump.

BULLETIN ON REQUEST

THE NASH ENGINEERING COMPANY

221-AS WILSON ROAD, SOUTH NORWALK, CONNECTICUT

How to Get Heating Business in Defense Industry Buildings

IF recent summaries of the $700,000,000 National Defense Housing program have caused an anticipatory quickening of the pulse of the heating and ventilating industry, analysis of the billion dollar *industrial facilities* program now clearing through the National Defense Advisory Commission should inspire the industry to square its shoulders and stand by for action of unprecedented intensity.

The industrial construction program may be classified as follows:

1. Plants constructed by the Army and Navy for their own use.
2. Plants financed by Government funds but operated by private industry.
3. Plants financed and operated by private industry; construction funds to be repaid by Government in installments over a five-year period.
4. Plants or expansion financed and operated entirely with private funds.

The total estimated expenditure for the first three classifications is $532 million, according to a recent analysis (Nov. 20) released by the National Defense Advisory Commission. The total for the fourth classification is placed at $330 million for this year. It is likely this total will increase to $500 million in 1941.

How are heating and ventilating contractors and engineers to participate in this program?

Construction of plants for use solely by the Army or Navy follow the usual procedure observed in awarding cost-plus-a-fixed-fee contracts. From lists of available contractors, usually located near the contemplated project, the names of several likely builders are selected.

Type 1 Plants[1]

These selections are made by the Bureau of Yards and Docks, for the Navy; by the Office of the Quartermaster General, for the Army.

A contract is then negotiated between the contractor finally chosen and the Army or Navy office concerned. While major contracts are negotiated solely with general contractors, there are many projects involving only heating and ventilating. Heating and ventilating contractors interested in Government awards should therefore make certain that data regarding their qualifications is on file with the two sources of such awards—the Army and Navy construction offices listed above.

In each instance, the following is the procedure:

Contractors desiring consideration on construction contracts to be awarded by negotiation on a fee basis should communicate with either or both of the military construction offices previously named. The request for consideration should contain complete data regarding:

1. Experience on fee construction.
2. Experience in competitive bid construction.
3. Organization available (including architectural and engineering).
4. Equipment available.
5. Financial resources.

Statements under Items 1 and 2 should list types of projects, location and cost.

Architects and consulting engineers should submit letters to the same source offices requesting consider-

[1]These designations are used only for purposes of identification in this article and are not official classifications.

ation in case design contracts for various projects are awarded to civilian architects or consulting engineers on a fee basis; letters to contain the following:

1. Full experience record indicating clients by name, location of project, type of project and money value.
2. Organization available with particular view to rapid completion of plans and specifications.
3. List of projects designed for Federal agencies.

Where the heating and ventilating requirements are a part of the general contract, the sub-contractor must look to the general contractor for the actual award, but having the proper data on file with Army and Navy construction offices cannot be other than helpful during the period when a project is in its formative stages.

The sales-minded sub-contractor will make certain that complete information about his firm is in the hands of Government construction officers as well as in the files of general contracting firms likely to be in line for Government awards.

Too much stress cannot be laid upon the importance of having these data in the proper files, for under the cost-plus-a-fixed-fee system there is no advance notice of projects contemplated. Announcement of the actual awarding of the contract is the first published notice of the very existence of such a project.

While it does not necessarily follow that the announcement of awarding of a general contract means it is too late for the sub-contractor to participate as construction progresses, the advantages of having one's name up for consideration during the planning stages are self-evident.

Type 2 Plants

Construction of plants government-owned but privately-operated is limited to types for which the private operators would have no probable use should armament production be discontinued. Examples include the $20,000,000 Chrysler tank plant, several powder plants, some new shipyard capacity, and so on.

In this classification the manufacturer securing a contract for war materials may lack facilities to produce them in the quantities required. He may then be awarded a second contract covering cost-plus-a-fixed-fee construction of a plant having the necessary capacity.

Such a project then enters the usual commercial channels—the manufacturer selecting his own architect and general contractor to complete the building with the assistance of as many consulting engineers or sub-contractors as he may deem advisable.

The fundamental difference between construction of this type and that of Type 1 is that although the Government finances and will own the building upon completion, the manufacturer awards the actual building contract. Again the sub-contractor is somewhat dependent upon the general contractor selected, but since the Government will keep in close touch with contemplated plans and building progress, the advisability of having pertinent data on file with the Army-Navy construction offices at Washington, D. C. is apparent.

Type 3 Plants

Construction of this type involves new building and plant expansion financed initially with the private funds of the holder of an equipment contract, who is re-imbursed by Federal funds over a five-year period, at which time title to the plant reverts to the Government unless the manufacturer exercises his option to purchase the plant at cost less depreciation.

Included in this group are plants meeting defense needs somewhat in line with the operator's normal production, but capable of outputs much greater than can be absorbed under normal business conditions.

Again, construction procedure follows commercial practice, with the usual relationships existing between owner, architect and sub-contractors. Since the Government may eventually own the plant, however, it may be assumed that its military construction offices will participate in at least an advisory capacity.

Type 4 Plants

Commercial practice will govern all construction or expansion under this classification. Involving an estimated expenditure of $500 million in private funds by the end of 1941, this field offers the heating and ventilating industry a most fertile field for exploitation.

Sources of information regarding such projects are the usual building reporting channels, such as the F. W. Dodge Corporation compilations.

Federal estimates in this group are based upon pending and anticipated applications for certification under accelerated amortization sections of the new excess profits tax law. This law provides that manufacturers, in certain cases, may use an accelerated rate of depreciation for income and excess profits tax purposes on plants or equipment certified as necessary in the interest of national defense during the emergency period.[2]

While not strictly classifiable as facilities construction, a supplementary estimate announced by National Defense Advisory Commission contemplates $337 million for air bases, including hangars, shops, administration buildings and other utilities involving major heating and ventilating problems.

A second supplementary estimate under the National Defense Advisory Commission breakdown calls for an expenditure of $258 million for *other military construction*, including sea-coast defenses and construction of military and naval stations other than air bases.

The appended tabulation of projects is intended merely to give some hint of the magnitude of the current program and the opportunities it offers the heating and ventilating industry. The sketchiness of the tabulations will be apparent when it is explained they represent merely high spots from hundreds of pages of typed National Defense Advisory Commission announcements of the more than one billion dollars in construction contracts awarded since the commission was formed in June.

The tabulations are important only in that they present evidence of the actuality of the program, dispelling fears—if any there be—that the construction program is merely one of paper and pencil fabrication.

[2]The National Defense Advisory Commission announced November 1 that a procedure has been worked out jointly by the Commission and the War, Navy and Treasury Departments to handle applications from manufacturers for certification required by the amortization section of the new tax law. This law provides that manufacturers, in certain cases, may use an accelerated rate of depreciation for income and excess profits tax purposes on plants or equipment certified as necessary in the interest of national defense during the emergency period. Specifically, a manufacturer who constructed or acquired new facilities after June 10, 1940, may, in determining his taxes, amortize the cost of such facilities over a five-year period instead of the normal period of depreciation of such property if he receives a "Necessity Certificate."

CONSTRUCTION FINANCED BY GOVERNMENT FOR ITS OWN USE

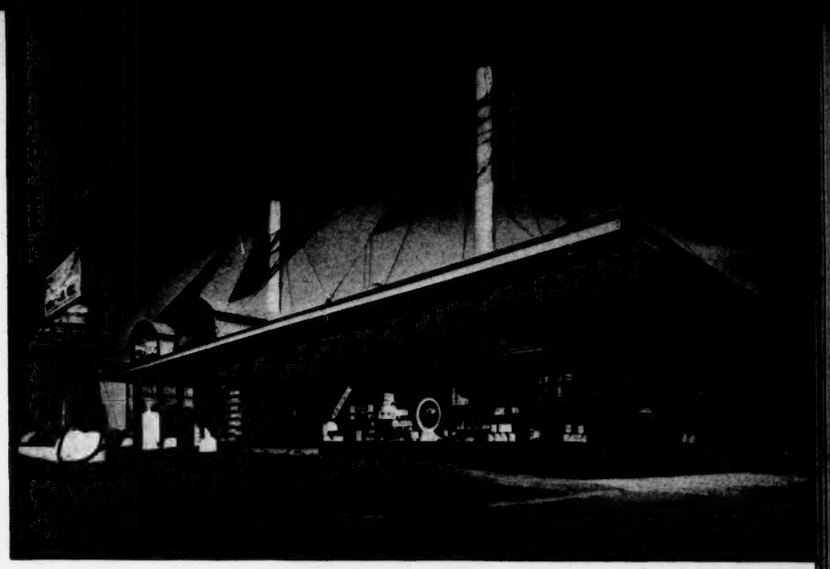
Location of Project	Awarding Agency	Contractor, Engineer or Owner	Purpose of Project	Value
Naval Supply Base, Oakland, Calif.	Navy	Clinton Constr. Co., San Francisco, Calif.	Aviation storage facilities	$1,800,000
Naval Reserve Base	Navy	Henger Constr. Co., Dallas, Texas	Aviation facilities	277,000
Marine Corps Supply Depot, Philadelphia, Pa.	Navy	Day & Zimmerman, Inc., Philadelphia, Pa.	Warehouse and accessories	1,170,000
Naval Powder Factory, Indian Head, Md.	Navy	Hardwood-Nebel Co., Washington, D. C.	Additional ammunition facilities	1,945,400
Navy Yard, Charleston, S. C.	Navy	Daniel Constr. Co., Anderson, S. C.	Shipbuilding facilities	463,500
Norfolk Naval Hospital, Portsmouth, Va.	Navy	R. R. Richardson & Co., C. J. Lindemann & Tunstall-Johnson Co., Norfolk, Va.	Laundry buildings and wards	437,000
Naval Operating Base, Norfolk, Va.	Navy	Doyle & Russell, Richmond, Va.	Storage facilities	856,000
Naval Torpedo Station, Newport, R. I.	Navy	Tredennick-Billings Co., Boston, Mass.	Torpedo assembly plant	675,000
Naval Mine Depot, Yorktown, Va.	Navy	Wise Contracting Co., Richmond, Va. Virginia Engineering Co., Newport News, Va.	Ammunition facilities	4,026,000
Naval Observatory, Washington, D. C.	Navy	Chas. H. Tompkins Co., Washington, D. C.	Storage building	531,000
Naval Training Station, Great Lakes, Ill.	Navy	Gibbs & Hill, Inc., New York, N. Y.	Power plant improvement	450,000
Marine Barracks, Parris Island, S. C.	Navy	Chas. W. Angle, Inc., Greensboro, N. C.	Storage and aviation facilities	2,394,750
Navy Yard, New York, N. Y.	Navy	Walter Kidde Constr. Co., New York, N. Y.	Sub-assembly shop and improvements	1,520,000
Navy Yard, Charleston, S. C.	Navy	Simons-Mayrant Co., Charleston, S. C.	Storehouse, cafeteria and improvements	390,000
Puget Sound Area, Wash.	Navy	The Austin Company, Cleveland, Ohio	Aviation, fuel, and ammunition storage facilities	7,300,000
Navy Yard, Norfolk, Va.	Navy	Rust Engineering Co., Washington, D. C.	Extension of machine shop	720,000
Navy Yard, New York, N. Y.	Navy	Turner Constr. Co., New York, N. Y.	Storehouse and accessories	4,000,000
Naval Torpedo Station, Newport, R. I.	Navy	Tredennick-Billings Co., Boston, Mass.	Explosive mfg. building and storehouse	585,000
Naval Proving Ground, Dahlgren, Va.	Navy	Jeffress-Dyer Co., Washington, D. C.	Hangar, etc.	235,000
Ft. Wingate, New Mexico	War	T. H. Buell & Co., and Prouty Engineering Co., Denver, Colo.	New ordnance	8,288,289
Hill Field, Ogden, Utah	War	Peter Kiewit & Sons, Omaha, Neb.	Depot supply building	890,175
Hill Field, Ogden, Utah	War	Mead & Mount Constr. Co., Denver, Colo.	Hangar	494,000
Patterson Field, Fairfield, Ohio	War	Kirk Building Co., Kansas City, Mo.	Warehouse	77,700
Hamilton Field, California	War	A. T. Beckett, Oakland, Calif.	QM Warehouse	54,989
Ft. Bragg, North Carolina	War	Wm. Hunt Co., Durham, N. C.	Piping work in various buildings	61,440
Langley Field, Virginia	War	Wilson Co., Charlottesville, Va.	Repair shop and warehouse	27,777
Duncan Field, Texas	War	J. E. Dickey, San Antonio, Tex.	QM Warehouse	92,332
Naval Supply Depot, Oakland, Calif.	Navy	James I. Barnes Co., Santa Monica, Calif.	Cafeteria and heating plant	317,400
Naval Torpedo Station, Keyport, Wash.	Navy	Dally Constr. & Engineering Co., Seattle, Wash.	3 Ammunition and industrial buildings	166,949
Jeffersonville, Ind.	War	C. A. Hooper Co., Madison, Wis.	Central heating plant	453,354
Hawthorne, Nev.	Navy	Wm. P. Neil Co., Los Angeles, Calif.	Ammunition storage	2,146,000

CONSTRUCTION FINANCED BY GOVERNMENT FOR PRIVATE OPERATION

Location of Project	Awarding Agency	Contractor, Engineer or Owner	Purpose of Project	Value
Union Center, Ind.	War	Bates & Rogers, Chicago, Ill. Todd & Brown, Inc., New York, N. Y.	Shell loading plant	$11,500,000
Weldon Springs, Mo.	War	Fraser Brace Co., New York, N. Y.	Powder plant	11,325,000
Burlington, Iowa	War	Day & Zimmerman, Inc., Philadelphia, Pa.	Shell loading plant	13,715,000
Baytown, Tex.	War	Humble Oil & Ref. Co., Houston, Texas	Plant to manufacture toluol	10,760,000
Charlestown, Ind.	War	E. I. DuPont deNemours, Charlestown, Ind.	Smokeless powder plant	26,000,000
Chickasaw, Ala.	Navy	Gulf Shipbuilding Corp., Chickasaw, Ala.	Reconstruct ship yards and buildings	2,500,000
West Homestead, Pa.	War	Mesta Machine Co. West Homestead, Pa.	Gun tube plant	1,680,000
Cincinnati, Ohio	War	Ferro Concrete Constr. Co., Cincinnati, Ohio		
San Francisco, Calif.	Navy	Bethlehem Steel Co., San Francisco, Calif.	Shipyard buildings, facilities	10,013,000
San Pedro, Calif.	Navy	Bethlehem Steel Co., Los Angeles, Calif.	Shipyard buildings, facilities	2,756,000
San Pedro, Calif.	Navy	L. A. Shipbuilding & Drydock Corp., Los Angeles, Calif.	Shipyard buildings, facilities	450,000
Bath, Me.	Navy	Bath Iron Works Corp., Bath, Me.	Fabricating shop and facilities	1,600,000
Quincy, Mass.	Navy	Bethlehem Steel Co., Quincy, Mass.	Shipyard buildings and equipment	13,427,000
Camden, N. J.	Navy	Camden Forge Co., Camden, N. J.	Buildings, tools, furnaces	2,873,695
Staten Island, N. Y.	Navy	Bethlehem Steel Co., Staten Island, N. Y.	Buildings, piers, cranes, etc.	2,706,000
Philadelphia, Pa.	Navy	Henry Disston & Sons, Philadelphia, Pa.	Addition to armor plate plant	1,018,400
Bethlehem, Pa.	Navy	Bethlehem Steel Co., Bethlehem, Pa.	Buildings and facilities	23,607,000
Pittsburgh, Pa.	Navy	Carnegie Illinois Steel Co., Pittsburgh, Pa.	Buildings, tools	2,677,000
Wilmington, Ill.	War	Sanderson & Porter, New York, N. Y.	Ammunition loading plant	14,000,000
Radford, Va.	War	Hercules Powder Co., Wilmington, Del.	Powder plant	25,000,000
Detroit, Mich.	War	General Motors Corp., Detroit, Mich.	Equipment for 4 machine gun plants	20,000,000
Wilmington, Del.	War	E. I. DuPont deNemours, Wilmington, Del.	Powder plant	25,000,000
Macomb County, Mich.	War	Chrysler Corporation, Detroit, Mich.	Tank plant	20,000,000

CONSTRUCTION FINANCED PRIVATELY—GOVERNMENT TO REIMBURSE IN FIVE YEARS

Downey, Calif.	War	Vultee Aircraft, Inc., Downey, Calif.	Plant expansion	4,294,798
Santa Monica, Calif.	War	Douglass Aircraft, Santa Monica, Calif.	Airplane plant expansion	11,254,700
Seattle, Wash.	War	Boeing Airplane Co., Seattle, Wash.	Airplane plant expansion	7,368,819
Wichita, Kansas	War	Boeing Airplane Co., Seattle, Wash.	Airplane plant expansion	3,367,943
Wichita, Kansas	War	Beech Aircraft Co., Wichita, Kansas	Airplane plant expansion	1,619,509
Wheatfield Township, New York	War	Bell Aircraft Corp., Wheatfield, N. Y.	Airplane plant expansion	1,023,000



Chicago filling station designed on suspension principle. Excepting a shallow foundation for stone structure in middle and concrete tower footings no other foundations were poured. The glass walls were built up to the roof and perform no supporting function. The odd-shaped, dark areas on cables are sections of wire-netting supporting neon tubing which spell out the word G-A-S in eleven foot letters. Projection heaters were made by Trane Company. Boiler by Kewanee. Oil burner by Sanmeyer Corporation.

Unit Heaters Warm All Glass Suspension Type Gas Station

AN automobile service station and accessories sales-room was built in Chicago early this year, utilizing the suspension method of supporting a broad roof. As the walls are almost entirely of plate glass, the heat loss consequently presented an equally unusual problem in heating. Furthermore, one half of the building comprises a two-room section used for washing and greasing the cars. Raising and lowering the doors naturally causes abrupt drops in temperature in a climate notable for its day to day fluctuations.

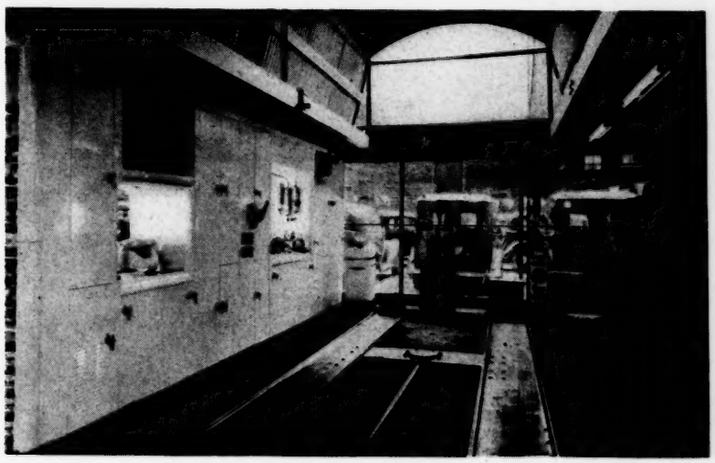
The structure itself is comparable to the big-top of the circus. Two columns or towers, resembling tent-poles, are set in concrete footings. From these extend steel cables to various points on the roof. This, in turn, is anchored with 12 steel rods so that this basic part of the entire structure is entirely independent of any foundation. The plate glass sides were fitted beneath and fastened to the roof more to give rigidity and prevent vibration than to serve any supporting or strengthening function. In the center a limestone inclosure was built, extending to the rear, which comprises toilet rooms and a utility room containing the steam heating boiler.

In all there is approximately 1100 square feet of plate glass exposure involving a heat loss of an estimated 150,000 B.t.u. In the half of the building utilized for an office and accessory sales-room, the in-and-out traffic is comparatively small through an ordinary door, and something like a constant temperature can be maintained. A projection heater sized to deliver a maximum of 66,000 B.t.u. per hour was installed and is controlled by a room thermostat. In the other half, because of the violent fluctuations in temperature caused by opening the two doors, the heating was naturally reduced to an incalculable problem. The only answer lay in oversizing, and two projection heaters, each designed to deliver 52,000 B.t.u. at maximum fan speed were installed. These are manually controlled. Establishing reasonably comfortable temperatures is thus a matter of reducing or advancing the speed or cutting off the fan-motors.

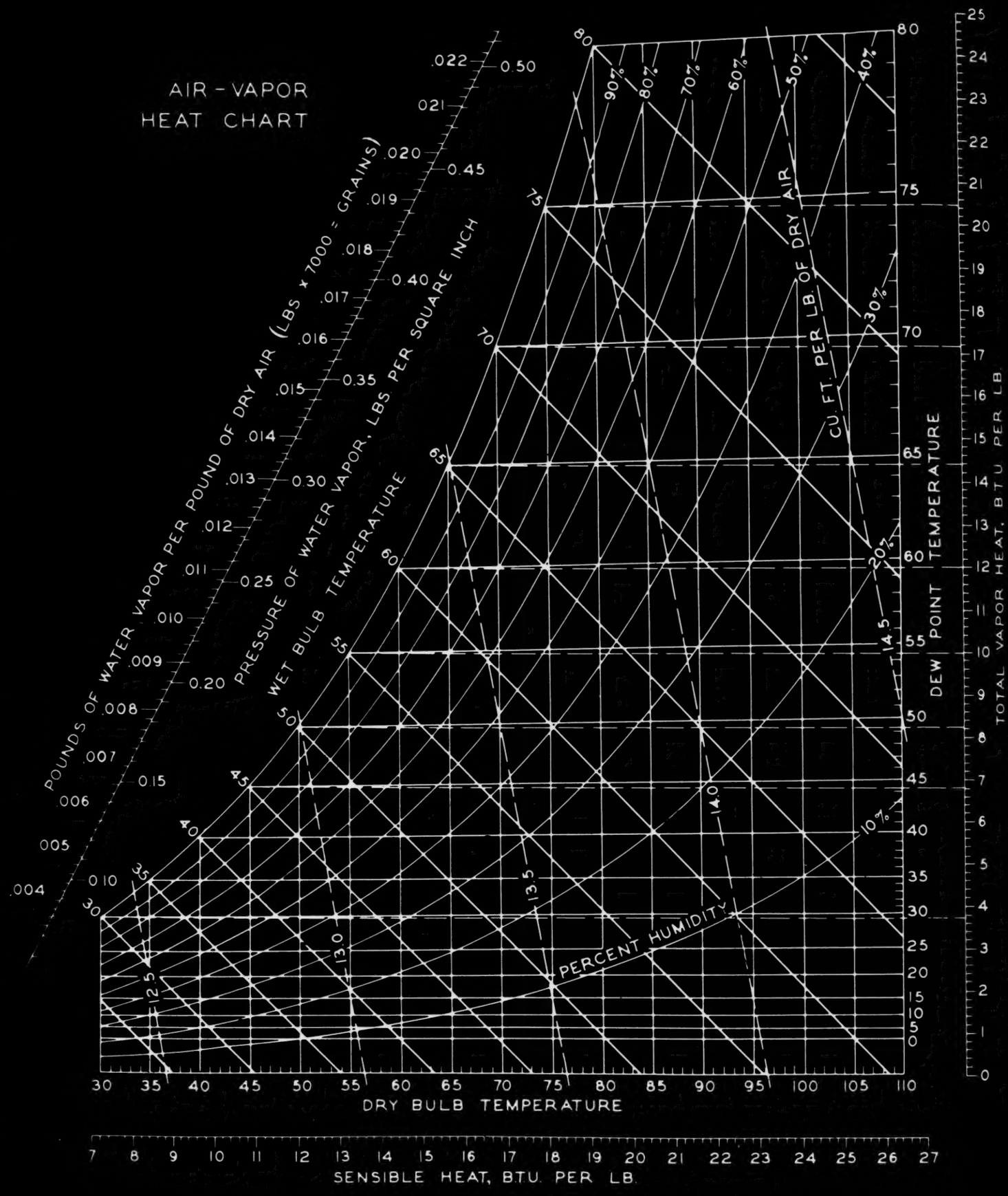
As a fortunate offset to an otherwise expensive heating operation, the filling station drains more than an ample supply of fuel from the crank cases of customers' cars. This oil is used in firing the boiler and the owner is confronted with the happy paradox of operating an uneconomical building economically.

Bertram Goldberg, the Chicago architect who designed the structure, estimates that the total cost was about one-half that of a comparable service station built along conventional lines. Furthermore, the fluorescent tube flood-lighted thirty-foot columns and the eleven-foot neon letters spelling out the word G-A-S have attracted a great deal of new trade from the heavily traveled LaSalle Street on which the station is situated. Gasoline sales have doubled since the new building was opened and because of the display value of the plate glass walls, automobile accessory sales have risen gratifyingly as well.

Other than the shallow concrete base for the stone structure and the tower footings, no foundations were poured.



Interior of one of two greasing or washing rooms showing two projection heaters, at left, each designed to deliver 52,000 B.t.u. per hour at maximum fan speed. Note the use of deflectors beneath each heater, intended to divide heat between the two work areas.


AIR - VAPOR
HEAT CHART
POUNDS OF WATER VAPOR PER POUND OF DRY AIR (LBS x 7000 = GRAINS)
PRESSURE OF WATER VAPOR, LBS PER SQUARE INCH
WET BULB TEMPERATURE
CU. FT. PER LB. OF DRY AIR
DEW POINT TEMPERATURE
TOTAL VAPOR HEAT, BTU PER LB.
PERCENT HUMIDITY
DRY BULB TEMPERATURE
SENSIBLE HEAT, BTU. PER LB.

Simple Chart for Air Conditioning Problems

By R. E. GEAUQUE†

In the accompanying article, the author presents his air vapor heat chart by means of which most air conditioning problems can quickly and easily be solved. In addition to presenting the chart, Mr. Geauque includes a number of practical examples and follows through with their solution.

THE present systems of calculating heat loads for air conditioning use as a starting point the physical properties of the air under consideration. Calculations starting with such properties as the vapor pressure and the weight of water vapor in the air, the temperature, specific heat, and density of the air at the conditions encountered, require a long series of calculations to convert these terms into values of air heat content.

Since the heat load for each installation, made up of sensible and latent heat loads, must be calculated from the physical properties of the air at each set of conditions which are different and peculiar to each installation, the logical plan is to calculate the sensible and latent heat content of air under all conditions and have these calculated results in a chart, available for any problem encountered.

On this basis, the Air-Vapor Heat Chart (Fig. 1) has been constructed to facilitate the calculation of air conditioning problems. This new chart is based directly on the heat content of air in B.t.u. per pound of dry air and makes possible the direct reading of the total heat content of moist air in any state covered by the chart.

Since changing air conditions are important primarily in relation to the corresponding change in heat content which the air undergoes, the Air-Vapor Heat Chart affords an excellent means of graphical representation by plotting the actual heat changes which take place in the air mixture in terms of both latent and sensible heat content. The psychrometric charts of Carrier, Bulkeley, Urban and Hill, which are based upon the temperature-vapor pressure relationship, cannot be used in this direct manner.

The quality of the Air-Vapor Heat Chart graphically to represent changing air conditions in terms of heat content, gives the chart several advantages over the vapor pressure charts. As will be shown, the required entering temperature of the conditioned air supply can be quickly obtained if the heat loads on the structure are known. Likewise, the temperature of the mixture of outside and recirculated air entering the air conditioning unit can be quickly obtained when the conditions and quantity of fresh air are known. By reading the B.t.u. heat content of the air at these two conditions, the heat load on the air conditioning unit is easily calculated. In addition to the above advantages, changes in both latent and sensible heat can be graphically followed in the various stages of a reheat cycle.

†Graduate School of Engineering, Harvard University.

Heat Content Representation

The Air-Vapor Heat Chart has been developed by plotting the sensible heat of dry air, together with the corresponding dry bulb temperatures, along the horizontal axis, and the corresponding total heat of the water vapor in the air, at this dry bulb temperature, along the vertical axis. The temperature scales are in degrees F, while the sensible and latent heat scales are in B.t.u. per pound of dry air.

The saturation curve, which is the upper boundary of the chart, is constructed by plotting the sensible heat of dry air at the various dry bulb temperatures against the total heat of the quantity of water vapor sufficient to saturate the air at these various temperatures. The percentage humidity lines are drawn for a change of every 10% and have a curvature similar to the saturation curve.

The dew point temperature lines in the chart are lines of constant moisture content of the air. These lines are practically horizontal through the chart with a slight slope upward to the right. This upward slope of the dew point lines is due to a total heat gain of the water vapor as its dry bulb temperature increases.

In Fig. 1 the wet bulb temperatures are indicated along the saturation curve. The wet bulb temperature lines slope downward to the right from the saturation curve and represent a path of total heat content for the air-vapor mixture. These lines are determined from the theory of adiabatic saturation of air by water vapor.

The dashed lines in Fig. 1, sloping upward to the left from the vertical of the chart, are lines which represent the volume of the air at any point in the chart in cubic feet per pound of dry air. Since all heat values are read on the chart by extending perpendicularly from the point to the corresponding scales, the perfectly horizontal dashed lines were added to eliminate the erroneous procedure of using the dew point lines to determine the total vapor heat. It must be remembered that the total heat at any condition on the chart is the sum of the sensible and total vapor heat contents as read from the corresponding scales.

A scale has been added above the saturation curve so that additional properties of the air-water vapor mixture can be obtained. The pounds of water vapor per pound of dry air can be read on one side of this scale while the other side gives the pressure of the water vapor in pounds per square inch absolute. To read the above scale it is necessary to follow the slope of the nearest dew point line until the scale is intersected.

Application of Heat Paths

The clear graphical conception of air conditioning problems and the ease of their solutions made possible by use of the chart can best be shown by the solution of a number of specific problems by means of the chart.

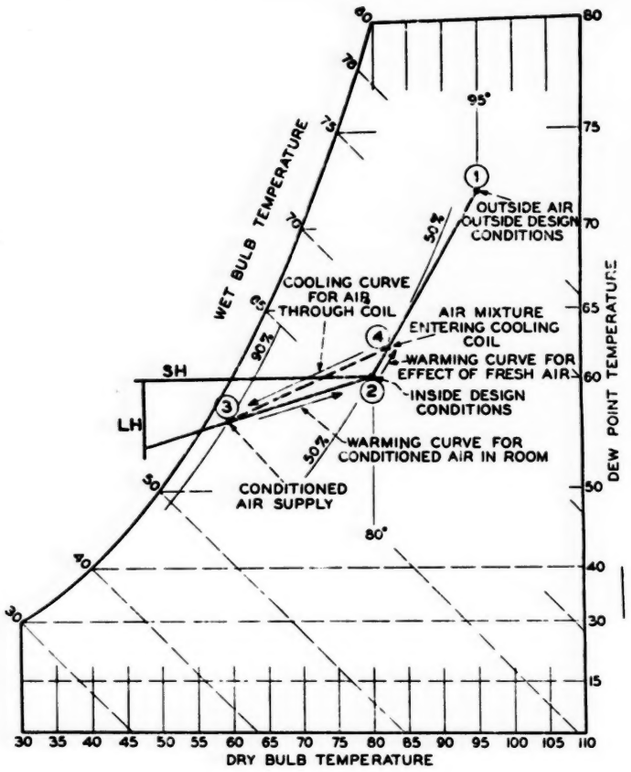

WET BULB TEMPERATURE
DEW POINT TEMPERATURE
DRY BULB TEMPERATURE
OUTSIDE AIR OUTSIDE DESIGN CONDITIONS
COOLING CURVE FOR AIR THROUGH COIL
AIR MIXTURE ENTERING COOLING COIL
WARMING CURVE FOR EFFECT OF FRESH AIR
INSIDE DESIGN CONDITIONS
WARMING CURVE FOR CONDITIONED AIR IN ROOM
CONDITIONED AIR SUPPLY
SH
LH
95°
80°
50%
90%
30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110
80 75 70 65 60 50 40 30 15

Fig. 2. The heat paths of an air conditioning cycle plotted on the chart.

A typical problem encountered in summer comfort air conditioning will serve for a detailed description. An internal sensible heat load of 27,500 B.t.u. per hr. and a total vapor heat load (hereafter termed *latent* heat load) of 8,000 B.t.u. per hr. will be assumed for the structure, giving a total internal heat load of 35,500 B.t.u. per hr. This total heat value does not include the outside air load of the structure. The outside air supply required by the structure is obviously dependent upon a number of factors, such as the number of people present, etc., and for this example an outside air supply of 210 c.f.m. will be assumed.

The state of the fresh air supply may be taken as 95F dry bulb and 78F wet bulb temperature (point 1, Fig. 2). The inside design conditions of the air insuring comfort in the structure, are 80F dry bulb temperature and 50% relative humidity (point 2, Fig. 2).

The cycle through which the conditioned air must pass in order that the design conditions are maintained, is represented in Fig. 2. Point (2) represents the inside design conditions or the final state of the air inside the structure. In order to determine the state of the air supply, point (3), which first enters the room, it is necessary to find the relation between the sensible heat increase and the latent heat increase which the air undergoes. This is done by laying off the value of the sensible heat load to the left of point (2) along the dew point temperature line. A convenient scale is chosen (generally a fraction of an inch, such as ½ in. or ¼ in. representing 1,000 or 10,000 B.t.u. per hr. of the load) so that the line has a convenient length. To this same scale, the value of the latent heat load is drawn vertically downward from the end of the line representing the sensible heat load of the structure. Point (2) is connected with the lower end of the latent heat line and the relationship of the increase in both types of heat content is determined. This line is designated as the warming curve for the conditioned air in the room.

The state of the conditioned-air supply entering the room at point (3) is determined at the point of intersection of the warming curve with the 90% humidity line. It is assumed that an air conditioning coil will be used to cool the air in use, and that direct measurements of the air humidity leaving a coil of this type show an average of 90%. By determining point (3) the dry bulb temperature of the supply is set at 59F.

As the sensible heat load alone determines the volume in cubic feet per minute of conditioned air required by the structure, this value can be determined from the dry bulb temperature change shown by the warming curve. The total sensible heat load is 27,500 B.t.u. per hr. while each pound of air passing from point (3) to point (2) has a sensible heat increase of 5.1 B.t.u. This value of 5.1 is obtained from the chart by reading the sensible heat values at the two points and finding their difference. The c.f.m. required is as follows:

$$\frac{\text{B.t.u. Sensible Heat Load} \times \text{Specific Volume}}{\text{B.t.u. Sensible Heat Change per pound dry air} \times 60}$$

$$= \frac{27{,}500 \times 13.5}{5.1 \times 60} = 1{,}220 \text{ c.f.m. required.}$$

As stated, of the total air supply, 210 c.f.m. must be outside air while the remainder will be recirculated air taken from the room. Point (1) represents the condition at which the fresh air will be obtained, namely, 95F dry bulb and 78F wet bulb temperature. Therefore, the air mixture which will pass through the coil will contain 210 c.f.m. of fresh air at the conditions of point (1) and 1220—210 or 1010 c.f.m. of recirculated air at the conditions of point (2). The line connecting these two points represents the path which both components would follow as they mixed and assumed a common temperature. The final common temperature reached at point (4) is determined from a weighted average of the two components as follows:

$$\text{Air Temperature} =$$

$$80\text{F} + \frac{210 \text{ (c.f.m.)} \times 15\text{F}}{1220 \text{ (c.f.m.)}} = 82.58\text{F.}$$

The path from point (4) to point (3) represents the cooling curve of the air supply as it passes through the air conditioning coil.

The change in the heat content of the air-water vapor mixture from point (4) to point (3) represents the total heat load which the coil must remove, per pound of dry air, from the mixture. From the chart the change in sensible heat per pound of dry air is found to be 5.6 B.t.u., while the change in latent heat is found to

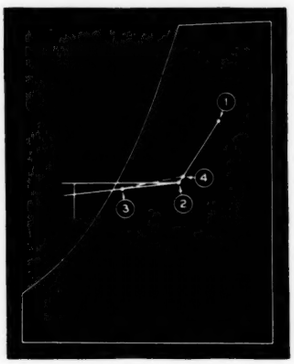


Fig. 3.

be 2.8 B.t.u. Thus, the total heat per pound of dry air which must be removed by the coil is 8.4 B.t.u. as read from the chart. The total load on the coil to cool 1220 c.f.m. becomes:

$$\text{Coil Load} = \frac{A \times 60 \times Z}{\text{Specific Volume}}$$

where A is the air supply in c.f.m. and Z is the total heat change in B.t.u. per pound of dry air. Therefore, the coil load is

$$\frac{1220 \times 60 \times 8.4}{13.5} = 45{,}600 \text{ B.t.u. per hr.}$$

The increase in the total heat load of the coil over the total internal heat load of the structure is plainly due to the additional load of the outside air supply. The tons of refrigeration needed is calculated from the total load: tons refrigeration equals 45,600 ÷ 12,000 = 3.8 tons.

Direct Solutions on the Chart

Problem: Air conditioning a doctor's office (Fig. 3):
Design conditions:

Outside conditions (point 1): 93F D.B. and 76F W.B.

Inside conditions (point 2): 80F D.B. and 50% R.H.

Outside air supply of 300 c.f.m. for 30 people.

Internal load of the conditioned space:

Sensible Heat	52,320 B.t.u. per hr.
Latent Heat	5,400 B.t.u. per hr.
Total Internal Load	57,720 B.t.u. per hr.

SOLUTION: From point 2 (Fig. 3) draw the internal sensible heat line to the left, parallel to the dew point line, to the scale of ½ in. = 10,000 B.t.u. per hr. From the left end of this line, draw the internal latent heat line vertically downward to the same scale. Connect the lower end of the latent heat line with point (2) and determine point (3) on the 90% humidity line.

Conditioned air entering temperature (point 3) = 62F D.B.

Sensible heat change (pt. 3 to pt. 2) = 4.32 B.t.u. per lb.

Required air supply: $\frac{52{,}320 \times 13.5}{4.32 \times 60} = 2725$ c.f.m.

Temperature of recirculated air: $80 + \frac{300 \times 13}{2725}$

= 81.4F D.B.

Total sensible heat change (pt. 4 to pt. 3) — 4.65 B.t.u. per lb.

Total latent heat change (pt. 4 to pt. 3) — 1.03 B.t.u. per lb.

Total heat change in air conditioning unit — 5.68 B.t.u. per lb.

Load on A.C. unit: $\frac{2725 \times 60 \times 5.68}{13.5}$

= 68,791 B.t.u. per hr.

Required refrigeration: 68,791 ÷ 12,000 = 5.73 tons.

Water condensed from air: read on scale to left by extensions from point (3) and point (4), and parallel to the dew point lines give .00093 lb. water per lb. of dry air.

$$\frac{.00093 \times 2725 \times 60}{13.5}$$

= 11.26 lb. water per hr. condensed.

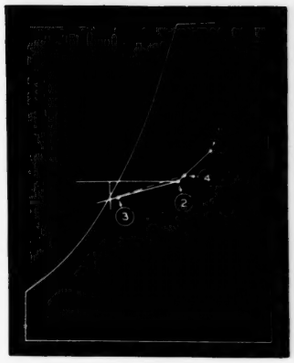


Fig. 4.

Problem: Conditioning a grocery store (Fig. 4):
Design conditions:
Outside (point 1):
91F D.B. and 73F W.B.
Inside (point 2):
80F D.B. and 50% R.H.
Outside air supply:
3000 c.f.m.

Internal load of the conditioned space:

Sensible Heat	351,790 B.t.u. per hr.
Latent Heat	91,250 B.t.u. per hr.
Total Internal Load	443,040 B.t.u. per hr.

SOLUTION: From point 2 (Fig. 4) draw the internal sensible heat line to the left, parallel to the dew point line, to the scale of ½ in. = 100,000 B.t.u. per hr. From the left end of this line, draw the internal latent heat line vertically downward to the same scale. Connect the lower end of the latent heat line with point (2) and determine point (3) on the 90% humidity line.

Conditioned air entering temperature (point 3) = 60F D.B.

Sensible heat change (pt. 3 to pt. 2) = 4.8 B.t.u. per lb.

Required air supply: $\frac{351{,}790 \times 13.5}{4.8 \times 60} = 16{,}490$ c.f.m.

Temperature of recirculated air (pt. 4):

$$80 + \frac{3{,}000 \times 11}{16{,}490} = 82\text{F D.B.}$$

Total sensible heat change (pt. 4 to pt. 3) — 5.28 B.t.u. per lb.

Total latent heat change (pt. 4 to pt. 3) — 1.76 B.t.u. per lb.

Total heat change in air conditioning unit — 7.04 B.t.u. per lb.

Load on A.C. unit: $\frac{16{,}490 \times 60 \times 7.04}{13.5}$

= 515,954 B.t.u. per hr.

Required refrigeration: 515,954 ÷ 12,000 = 43 tons.

Water condensed from air (read on scale to left by extensions from point (3) and point (4) and parallel to the dew point lines): .00152 lb. water per lb. of dry air. $\frac{.00152 \times 16{,}490 \times 60}{13.5}$

= 111.4 lb. water per hr. condensed.

Conclusion

An Air-Vapor Heat Chart has been constructed and air conditioning cycles have been drawn on it to illustrate its use in the solution of air conditioning problems. These solutions show the Heat Chart to have advantages over previous psychrometric charts due to the relative simplicity with which the following are found: 1. Entering temperature of conditioned air to conditioned space. 2. Temperature of the air entering the air conditioned unit. 3. B.t.u. content of the air at any point in the air conditioning cycle. 4. Heat changes in the various stages in any heat cycle.

Heat from Radio Tubes Warms WBZ

BOSTON'S newest radio broadcasting station, built by Westinghouse for WBZ, which has been on the air for nineteen years, gave its initial broadcast this summer. The station put on the air was by a small atom smashing machine, built for the purpose by Dr. E. U. Condon, associate director of the Westinghouse Research Laboratory in East Pittsburgh.

The new element, Uraniam 235, was used for this purpose, as the target, the release of the atomic electric current being picked up by a collector plate, amplified by electronic tubes and used to operate a relay which put WBZ on the air. The clicks sounded when each atom was broken off, could be distinctly heard by listeners in their receivers, they having been forewarned by the announcer talking from the studio over the old station, the atomic action serving to cut over the station from the former transmitter at Millis to the new one at Hull.

The new station is located at the edge of salt marshes in Hull, near Nantasket beach, and includes two 50,000-watt transmitters and one of 10,000 watts, housed in an attractive Cape Cod cottage style building. One 50,000-watt transmitter is for regular broadcasts and the other for international short-wave broadcasts with directional antenna systems for directing radiation to either Europe or South America. The 10,000-watt frequency modulation transmitter is designed to serve the metropolitan Boston area.

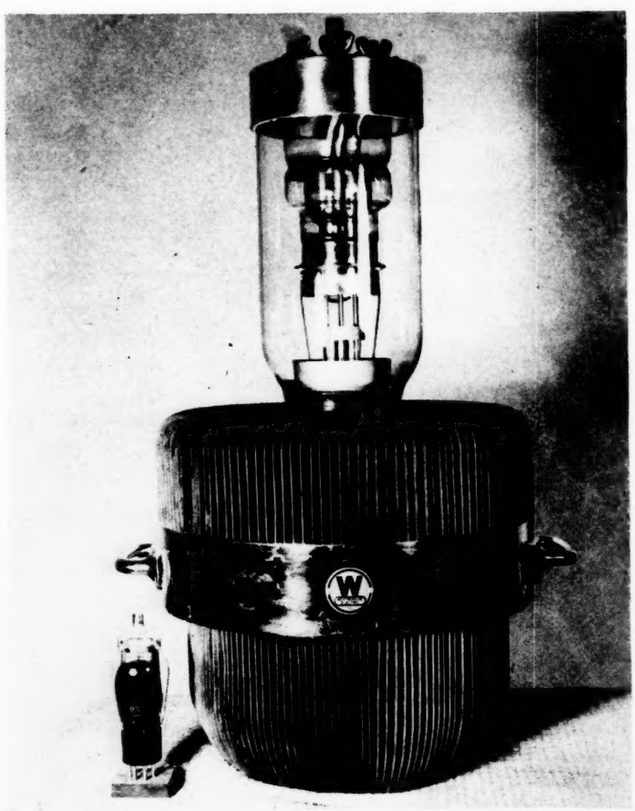
There are a number of features of interest, both to radio and heating engineers. One very unusual feature is that the giant, high-power tubes are all air-cooled instead of having water jackets. These tubes, cost $1600 each, weigh about 250 pounds apiece and are rated at 40,000 watts each. A number of small tubes also are used.

Naturally such enormous tubes emit a tremendous amount of heat, and to cool them would require eighteen to twenty tons of mechanical refrigeration, together with expensive pumps and other equipment formerly used to pump cooling water around the tubes at the rate of 125 g.p.m.

Instead two multivane Sturtevant blowers supply air through concrete ducts in floor at the rate of 7000 to 10,000 c.f.m. Capacity of the blowers is 20,000 c.f.m. against a 2 in. head, sufficient for all three transmitters if in operation simultaneously. There are eight of these giant tubes in all, two of them *spares*, and the total current when the program is on the air is 65 kw., which means a grand total of 221,675 B.t.u. per kw. hr. of heat that must be dissipated if human comfort of the staff and visitors, to say nothing of possible damage to equipment, is to be considered.

Tubes are seated by twos in metal cabinets, each on top of an insulator and crock or porcelain base. Surrounding the tube and topping the base is a copper ring, to which is soft soldered 144 copper fins for each tube, each fin 3 in. wide by 12 in. long and 0.125 in. thick. The copper ring is 1½ in. wide around the tube.

These copper fins carry off the heat emitted by the tubes in operation and it is carried down to the bottoms of the cabinets, which form plenum chambers. Thence, the heat is by-passed to outdoors, or in winter can be utilized for forced warm air heating of the entire building. With this great quantity of heat, there is no need of other heating equipment. Ducts carry the heat to the various rooms. The air is exhausted through overhead ducts and vented to outdoors, or circulated through other ducts to the main section of the building. Outside air is drawn from beneath the floor of the garage addition to the building, and filtered before it is passed under the tubes.



Weighing about 250 lb., the largest tube used in the 50,000-watt WBZ transmitter is air cooled. The copper fins dissipate the heat which is used to heat the building in which the broadcasting station is located. For comparison, the smallest tube in the station is shown beside the largest one.

For cooling the control room in summer, a blower is located in the attic, passing outside air through a 12-ft. duct lined with a rock wool blanket for sound proofing and blown down through a built-in duct at the back, up at the front and to the top of a side wall, discharging through registers. Mechanical variation can be made from complete recirculation to complete fresh air supply.

Temperature is automatically kept even with outside temperature, with manual control for winter, or sudden changes or drop in outside temperature. No provision is made or is necessary for humidity control.

PROFITS IN AIR

DURKEE-MOWER, INC.,

manufacturer of Marshmallow Fluff, reduces beating time, lowers number of rejects, does away with wall condensation in moist beater-room, and improves working conditions with a gas-fired air dehumidifier installation.

THIS INSTALLATION

Owner — Durkee-Mower, Inc., Lynn, Mass.

Installation by — W. Warren Cummings and Associates, Boston.

HUMIDITY control has been found to be no luxury but actually a necessity in the beater-room of the plant of Durkee-Mower, Inc., Lynn, Mass., manufacturers of canned Marshmallow Fluff, a product largely used for home frosting, dessert making, and other confection uses. This product, which is sold in 4½ and 14 oz. cans, was developed by Fred L. Mower and H. Allen Durkee, owners of the enterprise since its organization in 1920, and both of whom are enthusiastic about the economies and improved work-

Fig. 1. Plant of Durkee-Mower, Inc., Lynn, Mass., where Marshmallow Fluff is made under rigid humidity control.

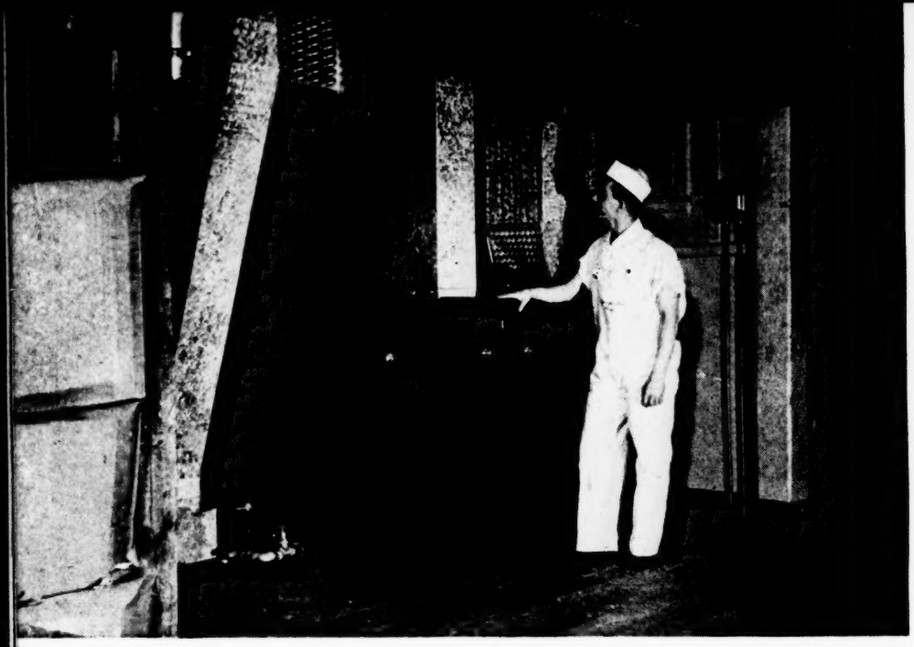


Fig 2. The gas-fired dehumidifier and its after-cooler coil (top left) maintains 72F and 45% R.H. in the beater-room despite high rates of moisture development in (and infiltration into) the room.

ing conditions which have been brought about by dehumidification.

The 1400 c.f.m. capacity gas-fired silica gel dehumidifier, installed in 1939, has brought about a more uniform product with regard to its moisture content; a reduction in the percentage of reverts experienced before humidity control was provided; elimination of condensation in the beater-room walls during cold weather; and finally a reduction in the beating time required for each batch.

The product is made in 34-lb. batches which is heated to 235F. A syrup at 100F is then added and the batch is placed in a beating machine for ten minutes. After beating the marshmallow is light and fluffy and is then placed in a filling machine where the Fluff is automatically bottom-fed into the cans, which then travel along the conveyor to a 120-can per min. capper. From the capper the cans travel by chute to the lower floor where they are packed in cases.

On alternate days 1200 cases of 12-oz. cans or 2700 cases of 4½-oz. cans (1 doz. cans per case) are produced. To maintain this capacity the most efficient and modern available machinery is required and to maintain this efficient production the controlled atmospheric conditions have been found to be highly desirable.

The Load

Batches of the raw material coming into the beater-room contain a considerable quantity of excess moisture which passes off into the room in large quantities. Added to this is the sensible and latent heat from the three employees working in that room and all of whom are quite active. Further, there is a small leakage into the room of moist air from other rooms in the plant, or, depending on the weather, from the outside. Other portions of the total load are made up of the sensible heat gain through the walls in the summer, the heat of the batches themselves, and the heat of the two 2-hp. motors driving the beaters, added to the single 5-hp. motor driving the can-filling machines.

The condition which it is desirable to maintain indoors is that of 72F dry bulb and 45% relative humidity, equivalent approximately to 52 gr. of moisture per lb. of air. To maintain these conditions the beater-room is supplied with 1400 cu. ft. of conditioned air furnished by one Bryant silica gel dehumidifier through a single register 6 ft. from the floor on the longest inside wall. The moist hot air is drawn from the room near the floor through another register in the same wall.

The dehumidifier is of the rotary type with silica gel beds in curved sections on a cylindrical drum rotating at about one revolution in nine minutes. As air is being dehumidified by passage through one silica gel bed, adjacent beds of silica gel are being reactivated by having passed through them air heated by gas burners. This operation is continuous so that the dehumidifying and activating functions are performed constantly and simultaneously as the unit rotates.

The Layout

The layout of this installation is shown schematically in Fig. 3. On days when the outside air is below approximately 50 gr. of moisture per lb. the cycle is as shown in Fig. 3 with outside air drawn into the dehumidifier where the moisture is adsorbed, thence through a duct from the top of the unit to the after-cooler through which is circulated 65F water and from there to the conditioned space. Moist air from the conditioned space under such conditions is drawn from the beater-room and supplied to the gas burners in the dehumidifier for combustion from which, with the products of combustion, it is exhausted to the outside of the building.

On days when the outside air is moist—above 50 gr. per lb.—the dampers indicated in Fig. 3 are all reversed so that the outside air is then fed directly to the burners for combustion air and then exhausted to the outside. The conditioned air under these circumstances is drawn from the beater-room, passes through the dehumidifier, and after-cooler and thence to the condi-

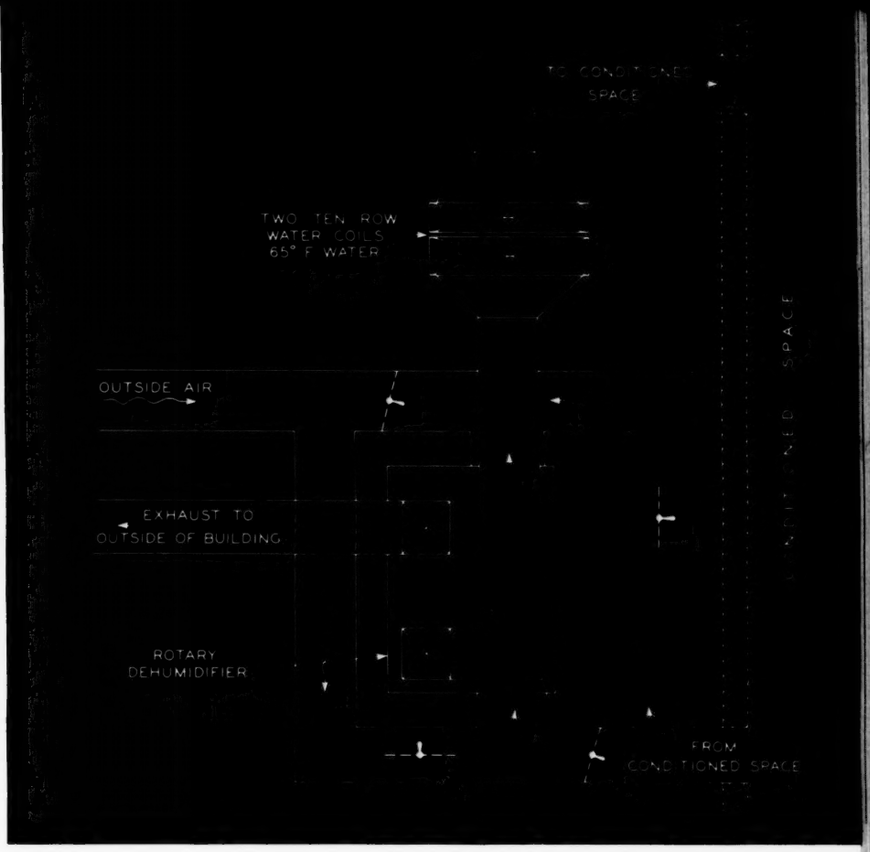


Fig. 3. Schematic diagram of the dehumidifier, aftercooler, and ducts. The lower inlet to and outlets from the dehumidifier are for the unconditioned and conditioned air; the upper inlet and outlet are for air to and products of combustion from the gas flames. As shown, the dampers are set for relatively dry outside air conditions; the moisture-laden room air is used for combustion. When the outside air has above 50 gr. per lb. moisture, the dampers are all reversed and outside air is used for combustion, while air from the conditioned space is recirculated through the dehumidifier.

tioned space. This arrangement made it possible to operate with one fan and with a much simpler layout than would otherwise have been possible.

Since one of the reasons for beating the marshmallow is to accelerate the evaporation of excess moisture the use of dehumidified air has been highly advantageous. In addition, however, the humidity control is just as important in that it makes it possible to follow a standard procedure so that, regardless of outside weather conditions, the rate of evaporation is maintained constant. For this reason the number of reverts has been reduced, thus adding to the advantages of the job.

In the past on moist summer days the beater-room would become so wet that water dripped from the walls and ceiling. This was not only unsuitable from the standpoint of process but also made the room atmosphere uncomfortable. This was one of the principal reasons why the management finally installed the dehumidifier. With the dehumidifier in operation and supplying approximately four air changes per hour not only have working conditions been made ideal but substantial savings in time and reverts have been effected.

Fig. 4. The beater-room, showing the filling machine (rear left), eight of the ten beaters, and, at the rear, the filled-can line traveling to the right toward the capper.

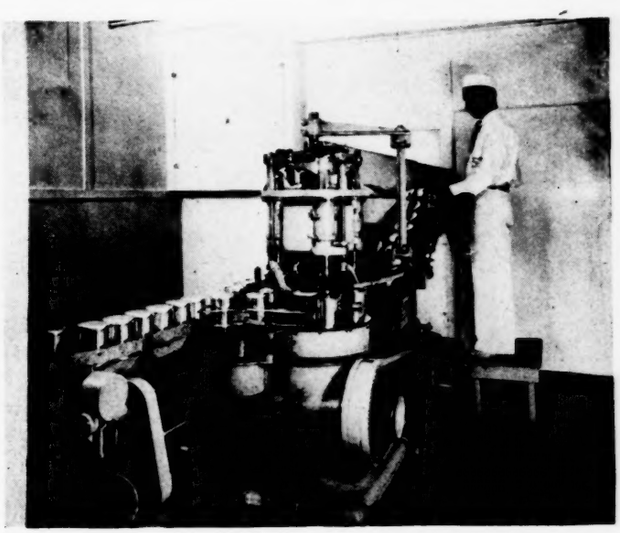
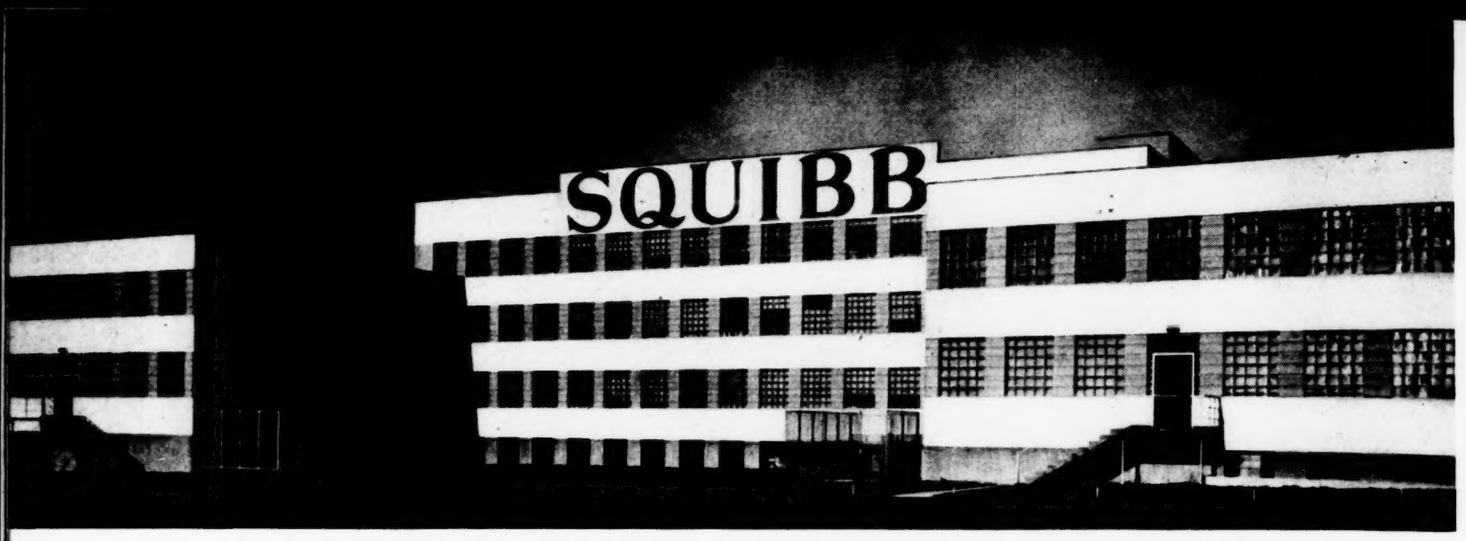


Fig. 5. The screw-top capper (120 cans per minute capacity) is automatic and will stop in the event of any interruption in the flow of either caps or filled cans.



Rear view of the Squibb Institute for Medical Research. The two wings are used for animal housing while the center section contains offices and laboratories.

E. R. SQUIBB AND SONS

specified air conditioning as a must in its plans for the company's chemical and biological laboratory to insure efficient working conditions for the scientific staffs and favorable environment for the animals used in research work.

By F. W. AUCHMOODY†

LOCATED toward the south end of their 54-acre tract at New Brunswick, New Jersey, The Squibb Institute for Medical Research is distinctly of modern design. The building is constructed in the form of a U consisting of two two-story wings used for animal housing and a three-story center section for offices and laboratories. The exterior is of light colored precast stone slabs using special exposed aggregates in several colors. Careful attention was given to the exterior so as to provide a surface of low solar transmission. To reduce the conditioning load further, the roofs of the various wings are flooded with from two to three inches of water in the warmer weather. This treatment not only reduces the refrigeration load due to sun effect, but tends to preserve the roof as well.

Light is provided by glass block windows which are integral parts of the building walls. The interior walls are of a pleasing light green glazed terra cotta with dust proofed concrete floors. Ceilings are of cement plaster with flush type lighting fixtures presenting a smooth unbroken surface which offers no obstruction to conditioned air distribution. Equipped with sprinklers and with hollow steel doors separating the various rooms and corridors, combined with metal furniture and laboratory equipment, the building is completely fireproof.

Animal Housing

There is a total of 124 rooms, of which approximately forty are used for animal housing. The balance of the rooms above the basement is used as offices and laboratories. Though the number of animals on hand fluctuates, as a rule there are about 25,000 housed and maintained in the building. These include rats, mice, chickens, frogs, rabbits, guinea pigs, roosters, monkeys, dogs, cats, pigeons and gophers.

With the exception of the basement, the building is completely air conditioned and it is possible, within limits, to maintain each room at a separate temperature depending on the room occupancy or the nature of work in progress. Animal rooms are usually maintained at a constant temperature of 78F and 50% relative humidity throughout the four seasons of the year; the offices and laboratories, on the other hand, are set for a minimum of 72F while heating is required and are permitted to rise on a sliding scale with the outside temperature in warmer weather.

Air conditioning in research work is acknowledged as a tremendous benefit. Heretofore during hot or humid weather, animal experiments were abandoned because of disturbing outside influences. Working in conditioned spaces permits these tests to go uninterrupted.

Air Conditioning Equipment

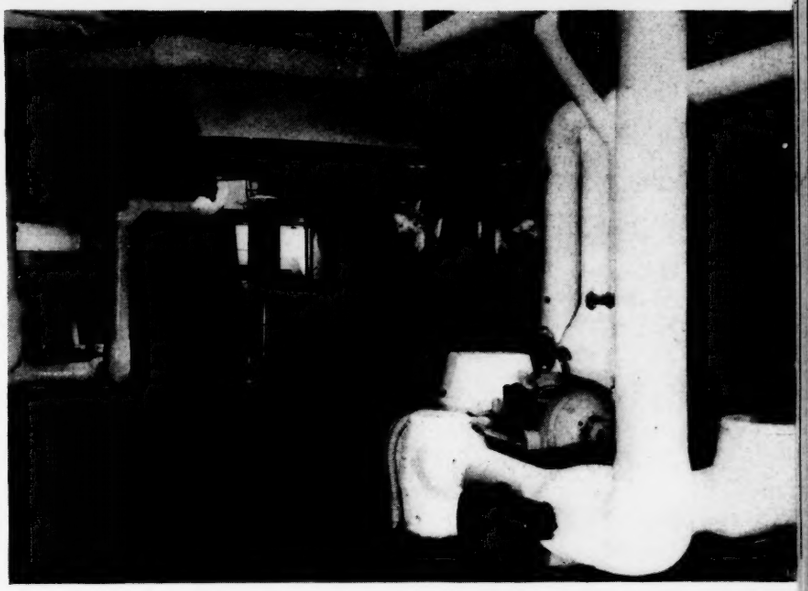
The air conditioning apparatus consists of three com-

†Maintenance Engineer, The Squibb Institute for Medical Research, New Brunswick, N. J.

plete systems located in the basement of the center section. The East and West Wing units which condition the animal quarters supply approximately 10,000 c.f.m. each and operate 24 hours a day. The conditioner supplying the office and laboratory section is a somewhat larger unit with a total supply volume of approximately 20,000 c.f.m.

For economy, 50% of the total air circulated is reused. This return air, however, is thoroughly processed before recirculation by filtering and passing through activated coconut carbon odor adsorbers. The entire fresh air supply is filtered through double banks of glass wool filters before entering the dehumidifiers and that which is supplied to the laboratory section is further processed by passing over banks of ultra violet ray sterilizing lamps to reduce bacterial count.

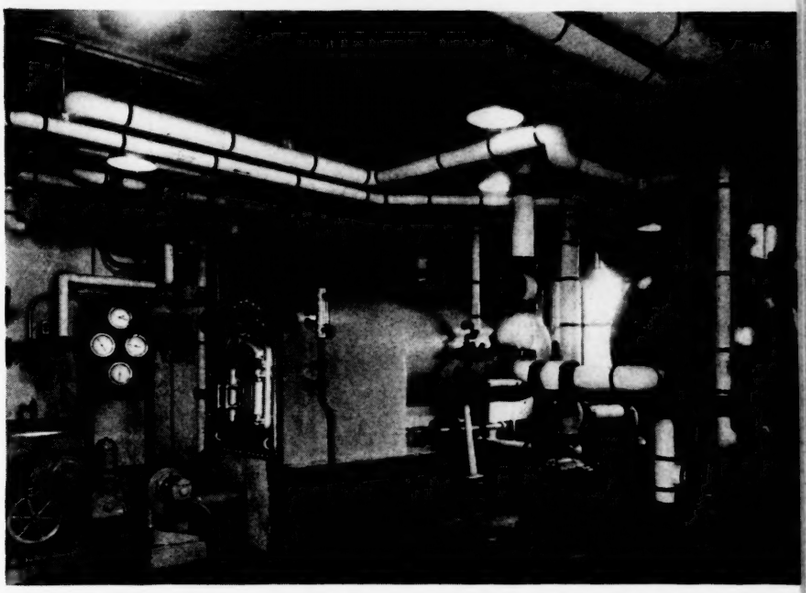
Inasmuch as the two animal systems operate 24 hours a day, cleaning of these washers, maintenance and repairs are accomplished by the aid of a system of cross over ducts permitting conditioned air to be supplied from the office and laboratory equipment while the animal systems are shut down.



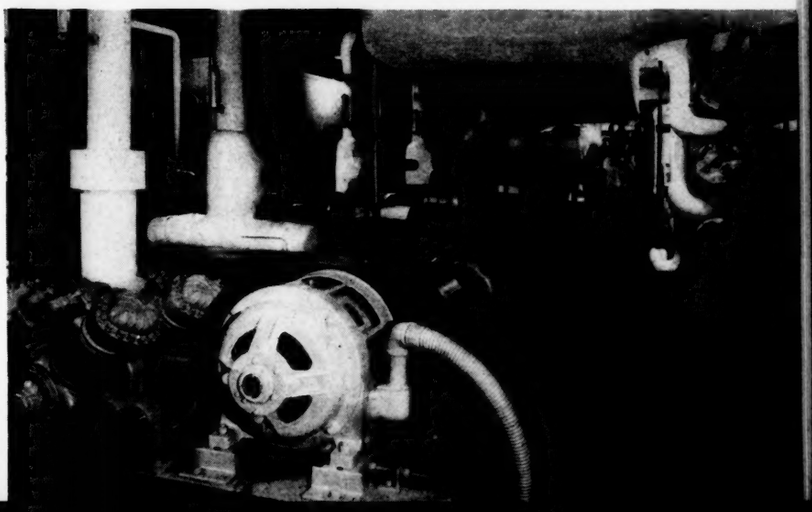
East end of the air conditioning machine room showing the office and laboratory dehumidifier. In case of a break-down cross over ducts permit conditioned air to be supplied to the animal system from the office and laboratory unit.

Controls

The temperature regulation equipment is of the pneumatic type. Starting and stopping the supply fans automatically opens or closes the fresh air dampers by electro-pneumatic relays connected into the pilot circuit of the fan starters. A further economy measure incorporated into the control system utilizes the benefits of a 100% fresh air supply to reduce refrigeration loads during the Spring and Fall when the outside wet bulb temperature is lower than that which is maintained in the conditioned spaces. This change-over is regulated by a wet bulb thermostat located in the fresh air supply duct and controls a series of return and fresh air dampers, making it entirely automatic. The temperature of the chilled water leaving the cooler is governed by electro-pneumatic controls starting and stopping the various compressors according to the need of refrigeration. A pressure control automatically cuts out all compressors should the chilled water circulation pump cut out or lose suction. This pressure control, as well as a low temperature cut-out, was installed as additional safety measures to guard against freezing the coolers even though the compressors are equipped with a low pressure safety control.



(Above) The oil fired pressure emergency boiler is shown in this room located in the basement. (Below) West end of the machine room showing the compact arrangement of the four 50-hp. refrigeration compressors. At the left are the evaporative condensers.



Refrigeration Equipment

Refrigeration for chilled water cooling is supplied by four 50-ton Freon compressors equipped with unloading devices so that each compressor may be operated at 50% capacity. The chilled water pump circulates 500 gal. per min. and at less than full loads a portion of this quantity is returned directly to the sump pit so that a maximum flow is maintained through the coolers at

Corridor showing the removable ceiling panels. Corridor ceilings are 14 inches lower than adjoining rooms so as to permit the use of side wall conditioned air outlets and provide space for services to laboratories and animal rooms on the floor above.

Typical animal room showing the supply and return air outlets. On the left, adjacent to the return outlet, is the room thermostat. These rooms are usually maintained at a constant temperature of 78F and 50% R.H. throughout the entire year.

all times. The condensing units are of the evaporative type and are located in the basement machine room. Excess air from the building air conditioning returns is exhausted into the machine room and used as partial air supply to the evaporation condensers. Due to this arrangement the wet bulb temperature in the machine room is usually several degrees lower than out of doors with a consequent increase in condenser efficiency even though a considerable portion of outside air is also drawn in for condenser supply.

Heating

Forced circulation hot water is employed as the heating medium in the air conditioned spaces. Hot water is circulated throughout the building from a heater located in the boiler room to individual extended fin type heaters. Conditioned air is supplied to each room through these heaters which are located in a plenum space provided above the corridors. The temperature of the incoming air is tempered according to room requirements and is controlled by varying the volume of water circulated through the heaters. A room thermostat in turn regulates the pneumatic water control valve.

Basement rooms are heated by small unit heaters controlled by individual electric room thermostats.

The steam which is used for laboratory purposes, air conditioning preheat and hot water heating, is normally supplied from the main plant boilers; however, a small high pressure oil fired boiler has also been provided in case of emergency breakdowns.

Unique Treatment of Piping Distribution

Above the corridors a piping space has been provided with removable transite panels. All laboratory services —gas, hot water, cold water, steam, distilled water, compressed air and vacuum—are concealed in this space with valves on each branch. Sprinkler, soil, vent and hot water heating lines are also carried through this space providing a readily accessible location to isolate various pipe lines from other parts of the building for maintenance and repair.

These hung ceiling spaces are also utilized as the air conditioning supply plenum chambers for air distribution to the various rooms of the Office and Laboratory section. All pipe lines carried through this plenum are doubly insulated to reduce heat pick up.

Chemical Hoods

Many of the laboratories are equipped with chemical exhaust hoods. Conditioned air is supplied to the rooms in which these hoods are located in the normal manner, but no air from these spaces is permitted to return to the air conditioning system. Each tile-lined exhaust stack to which the hoods are connected is equipped with a separate exhaust fan maintaining a negative pressure on the hood at all times, thereby preventing noxious gases or fumes from entering the conditioned spaces.

Cold Boxes

Each floor is equipped with a walk in type of cold box. While of different sizes each box is maintained at approximately the same temperature of 35F. These refrigerating chambers are used for the storing of volatile chemicals, viruses, media preparations, special animal diets, etc. All boxes are insulated with 4 in. of cork and finished inside with glazed terra cotta tile as are the other rooms throughout the building. The largest of these also houses a smaller sub-zero cold box which is used to store viruses in an inert state and is maintained at a temperature of minus 40F. The installation is unique in that the entire Freon cold compartment, compressor, condenser and motor are placed inside the larger box, serving practically as two stages of refrigeration. The smaller machine has an air cooled condenser and maintains an approximate head pressure of 55 lb. because of the 35F ambient temperature. This lowered head pressure reduces the compression ratio and increases the overall efficiency of the installation, making it possible to secure the desired temperature with a comparatively small compressor. A heat exchanger sub-cools the liquid entering the evaporator coils to approximately 0F. The entire apparatus imposes only a small load on the larger machine except when starting up and this can be materially reduced by placing dry ice in the ethylene glycol solution which is used as a circulating medium in the cold compartment. The anti-freeze solution is circulated over the cooling coils by a laboratory type of agitator and because the coils are covered at all times, periodical defrosting is unnecessary. The virus test tubes are

supported in the solution by means of a perforated plate.

Special Conditioning Apparatus

There are two rooms specially conditioned because of the nature of work carried on in that particular section. One, a room used for Syphilis experiments, is maintained at a constant temperature of 60F with a 50% relative humidity. It has been found through past experiences that the percentage of successful infections was greatest under these conditions. The regular central conditioning apparatus was unable to take care of this load as it would require carrying a much lower dew point on the entire system. In order to secure the desired results a separate self-contained unit was installed. Three hundred c.f.m. of 62F dry bulb 52F dew point air is supplied to the unit from the central conditioning apparatus for ventilating purposes and a portion of the room air is recirculated. This mixture enters the cooling coils of the self-contained unit and is dehumidified and cooled or heated as may be required. The room conditions are governed by a thermostat and humidistat controlling the compressor operation and a separate thermostat controlling a hot water coil for reheat purposes.

The Electrophoresis apparatus room was another requiring special attention. This equipment was set in an insulated room provided in the basement because of its sensitivity to vibration. In part, the apparatus consists of a chilled water tank equipped with a Schlieren lens through which protein photographs are taken. The operation of the apparatus is based on the fact that the molecules of a given protein in an aqueous solution are electrically charged and possess definite electrical mobility. The mobilities of different protein molecules may differ not only in magnitude but also in direction. Thus when a solution containing two or more kinds of protein molecules are electrolyzed, they will usually move in an electrical field at different rates. If electrolysis is carried out for a sufficient length of time, they can be separated and two well defined boundaries will appear. Tiselius devised an optical system whereby the formation of the boundaries during electrolysis at 2C can be followed accurately with a camera.

From the physico-chemical point of view it is very necessary to perform these experiments around 2C, approximately 35F. It will be readily understood that during humid weather condensation would take place on the Schlieren lens, fogging the photographs. To overcome this difficulty the room is dehumidified by a ceiling hung unit cooler connected to a one-ton air cooled compressor in an adjoining room.

Dust Proof Rooms

Because of the exacting nature of the work of the Division of Microbiology a great portion is carried on in dustproof rooms and cubicles. Constructed of steel and glass partitions, these cubicles were installed to provide a space, relatively free of air motion where experiments could be carried on with a minimum of contamination from outside sources. Some are fitted with ultra-violet sterilizing lamps which are turned on for short periods before the experimental work is started.

Placed in air conditioned spaces these cubicles depend solely on the wiping effect of the air circulated in the room for cooling. Ventilation air is taken through a filter equipped opening in the base of partition and passes out together with the bunsen burner heat and products of combustion through a baffled outlet in the ceiling.

Air conditioning is steadily becoming of increased importance in the manufacture and handling of chemical and biological products, both from the comfort angle and because of the sterile conditions imposed in connection with various operations.

From the experiences gained in their research laboratory, E. R. Squibb and Sons are now constructing a building where all the filling of serums, vaccines, antitoxins and glandular products will be carried on in sterile air conditioned spaces.

Various medical and engineering authorities contemplating the building of other research laboratories have visited The Squibb Institute and it is to be supposed that from the information accumulated and the introduction of additional ideas, further advances in air conditioning as applied to medical science can be expected in the near future.

Partial view of the Pharmacology laboratory showing the chemical exhaust hoods and the connection to riser stack. This view also shows the type of fireproof laboratory furniture used throughout the building.

Dustproof cubicles are installed in many of the Microbiology laboratories. These cubicles are virtually air tight except for the opening on the left which is equipped with double glass wool filters.

Reactions of Animals to Environmental Air Conditions

By SAMUEL BRODY†

There are two aspects to air conditioning and ventilating—the physiological, concerned with responses and adaptation of animals to their environment, and engineering, concerned with adaptation of the environment to the animal. Since, as the author points out, our knowledge of the engineering aspect is far ahead of our knowledge of the physiological aspect, it is timely for engineers to discuss physiologic aspects of the problem. Professor Brody is here concerned primarily with animals other than man and particularly with farm animals. The article is abstracted from a paper presented before the Farm Structures Division at the annual meeting of the American Society of Agricultural Engineers at St. Paul last summer.

THE following summary of basic facts relating to the reactions of animals to their environment may serve as an introduction to this discussion:

1. There is a minimum energy cost to being alive which is measured by heat production or heat dissipation, which is called "basal metabolism." In addition to this basal metabolism there are heat-production increases going under the names of "supermetabolism" or "heat increments" above the basal level. Thus the heat increment of feeding may double the heat production (Fig. 7); heat increment of muscular work in horses may increase heat production ten times (and for very short intervals up to one hundred times) that of the basal metabolism (Fig. 8). All productive processes, such as milk or egg production, have heat increments, partly because they are associated with increased feed consumption, and partly because there may be an energy expense to "making" the milk, eggs, and so on from their precursors.

2. The heat produced must be dissipated at such a rate as to keep the body temperature constant. In nonliving systems, the rate of heat flow from a body to its environment is directly proportional to its temperature gradient (Newton's law of cooling). Warm-blooded animals maintain constant body temperature at different environmental temperatures by various thermoregulatory devices discussed in the text.

3. Thermoneutrality is an environmental temperature at which the animal does not have to employ any of its thermoregulatory devices to keep its body temperature constant. This is because the environmental temperature is perfectly adjusted to keep the body temperature at its normal level without thermoregulatory devices. At thermoneutrality the animal feels neither hot nor cold. Thermoneutrality is a temperature zone close to the engineer's comfort zone. Its upper limit is about 85F. Heat production is minimum at thermoneutrality (Figs. 5 and 6).

4. At temperatures below thermoneutrality the animal keeps warm first by physical methods, not involving increase in heat production, then, as the temperature declines, by chemical methods involving increased heat production. Most farm animals can withstand low temperatures without discomfort and without much energy expense for keeping warm, because (1) under outdoor conditions of life they develop excellent insulation against cold in the form of hair, wool, or subcutaneous fat, and (2) their winter feeds have very high heat increments of feeding.

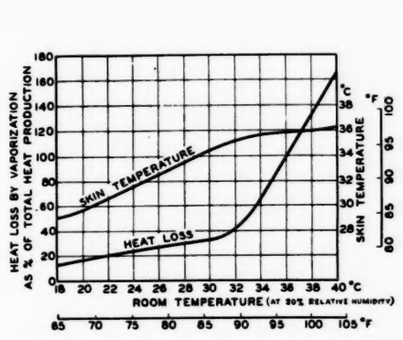
5. At temperatures below thermoneutrality, heat dissipation is mostly (up to about 70%) by radiation of infrared vaves. The remainder of the body heat is dissipated by convection-conduction (10 to 30%, depending on air movement and conductance of environment), and by water vaporization (20 to 28%), from lungs and skin, not involving vaporization of sweat. Humidity of the environment is not an important factor in heat dissipation at the lower temperatures.

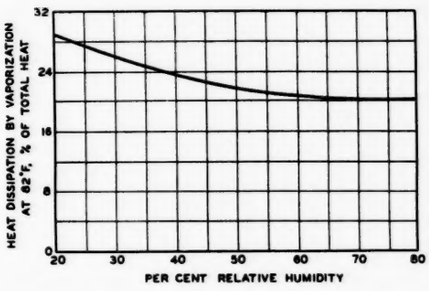
6. At temperatures above thermoneutrality (above about 85F) the burden of heat dissipation is rapidly shifted from radiation and convection to vaporization (Figs. 1 and 3). When the environmental temperature reaches or exceeds the level of skin temperature (about 95F), all the heat is dissipated by vaporization; and when the environmental temperature rises still higher, vaporization dissipates not only the heat produced by the body, but also the heat absorbed by the body from the hot environment (Fig. 2).

7. The reaction of animals to a hot environment depends mainly on their ability to sweat, and on the conditions which affect vaporization, namely, humidity and air movement. However, hot air movement is helpful only to sweating animals. Animals with dry skins are injured rather than benefited by fanning, because the high environmental atmosphere is driven against the cooler skin, thus heating, instead of cooling, the animal. Fanning does not help vaporization from the lungs because the lungs act as their own fans. Nonsweating animals may be kept cool by keeping their skin moist and fanning them only when the skin is moist. Sweating animals may be kept cool by fanning and, if possible, dehumidification. A prime factor in keeping cool in all cases is to reduce the heat increments of muscular exercise and of feeding in the heat of the day. The importance of sweating and of keeping the skin moist for keeping cool is indicated by the fact that, in sweating animals, from 40 to 95% of the vaporization is from the skin. Nonsweating animals resort to panting in hot weather in order to increase vaporization rate.

Keeping Cool in Hot Weather. There is only one

†Professor of Dairy Husbandry, University of Missouri.





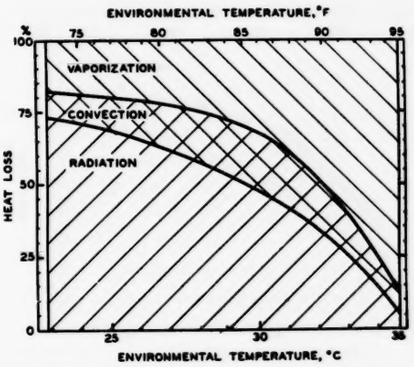


Fig. 1 (left). Relative influence of environmental temperature and on the heat loss by vaporization, expressed as percentage of heat production. Fig. 2 (center). Influence of relative humidity on percentage of heat dissipation by vaporization at 28C. Fig. 3 (right). Influence of environmental temperature on the heat loss by radiation, convection, and vaporization.

method for keeping cool in a hot environment, namely, by vaporization of water from lungs and skin. For every quart of water vaporized from the body, about 2400 B.t.u. of heat are dissipated. The amount of vaporization from an animal depends on its ability to perspire, and on the dryness of the air. Speed of movement of the air, as produced by fanning, also facilitates vaporization from animals that lose water from the skin, but does not appreciably facilitate vaporization from the lung, because the lung acts as its own fan. In sweating species, such as man, about two-thirds of the total vaporization is from the skin, and about one-third from the lung. In nonsweating species, most of the vaporization is from the lungs.

The engineering problem of keeping animals cool in hot weather is quite different for sweating than for nonsweating animals. A good fan may keep a sweating animal comfortable. But a fan will do little good to keep a sheep, cow, or dog cool, because it will not greatly facilitate vaporization from the skin. Nonsweating animals, such as cattle, could probably be cooled by vaporization as well as sweating animals, by keeping them moist by sponging or covering with a wet blanket, and fanning. It is suggested that facilities for this manner of cooling be extended to high-producing dairy cows that are particularly in need of cooling because of the high heating value of their feed.

Fig. 4, prepared from data by Hardy and Du Bois and from Regan and Richardson, shows the relative influence of environmental temperature on a sweating

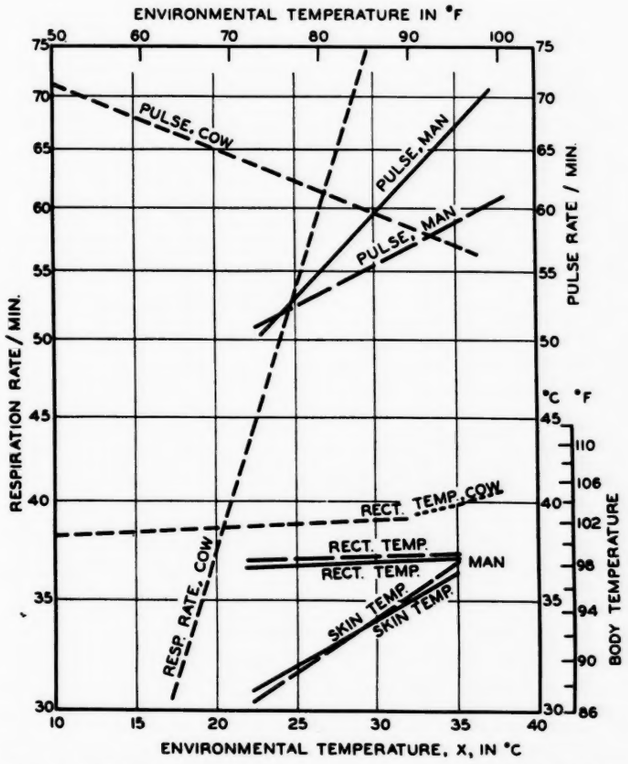


Fig. 4. Relative influence of environmental temperature on pulse rate and rectal temperature in man and cow. Influence of environmental temperature on skin temperature of man, and respiration rate of cow.

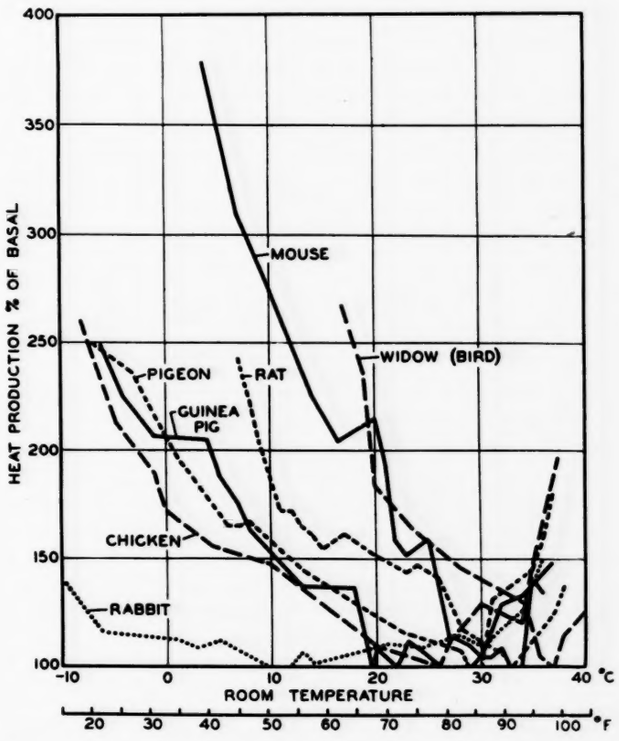


Fig. 5. Influence of environmental temperature on heat production of resting animals in postabsorptive condition. Influence of environmental temperature on heat production on rats acclimatized to different environmental temperatures

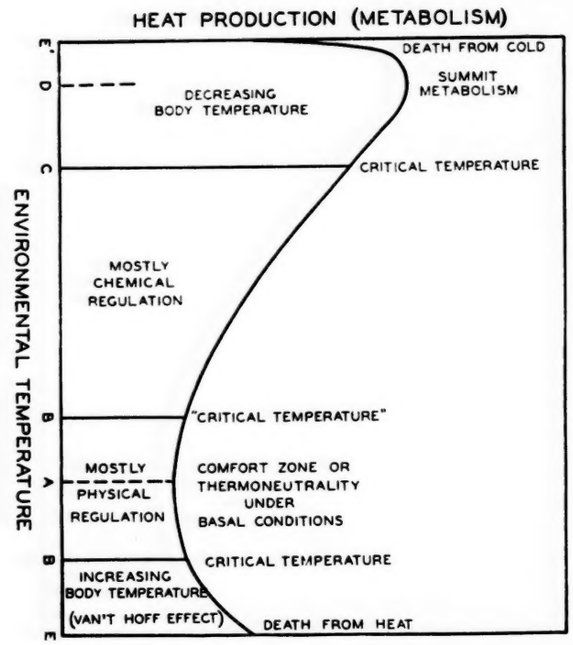


Fig. 6 (above). Diagrammatic representation of the reactions of animals to changing environmental temperature.

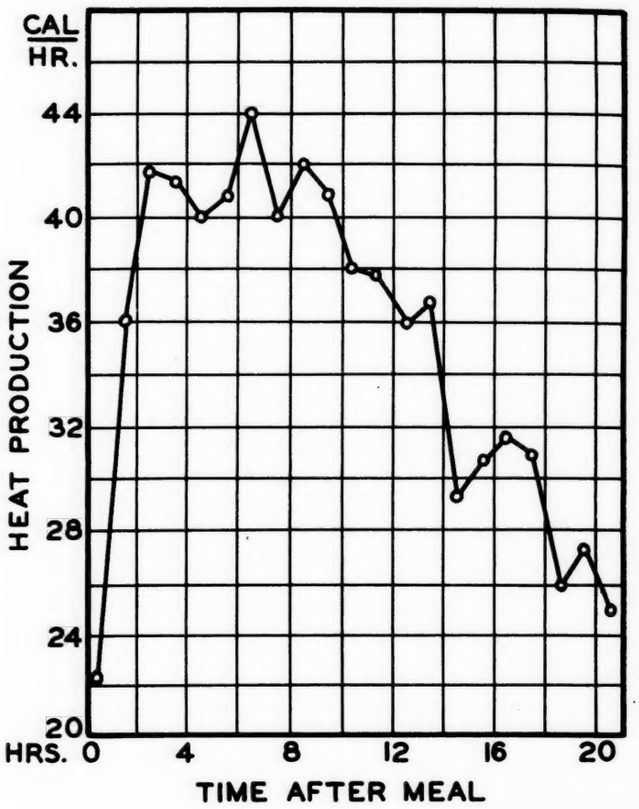


Fig. 7 (right). The rise and decline in heat production following the consumption of a meal of meat by a fasting dog.

species, nude man, and a nonsweating species, dairy cow. It seemed instructive to fit equations to the data. The equation for the increase of respiration rate with increasing environmental temperature in Regan's cows shows that for an environmental temperature increase of 1C, the respiration rate increased by 7.1%; or for a 10C increase, the respiration rate increased by 71% on the instantaneous-rate basis, or near 100% on the finite-rate basis. In other words, the respiration rate of the dairy cow is doubled by increasing the environmental temperature by 18F. Fig. 4 also shows important differences in the influence of environmental temperature on pulse rate in sweating man and nonsweating cow.

Overheating in Hot Weather. An animal is said to be overheated in hot weather when its rectal temperature and pulse rate rise above their normal levels. Such rise is often followed, especially in the aged, by collapse, variously referred to as heat exhaustion, heat stroke, and sun stroke. The collapse may be due to the high temperature as such, but more often it is the result of circulatory failure, partly as a consequence of the strain imposed on the heart of sweating animals by the necessity of more rapid circulation of the diminished blood available for the heart.

Another type of hot-weather disability which occurs in sweating animals in a *dry* environment is *heat cramp*. The outstanding symptom of heat cramp is disabling pain in the muscles, including the heart muscle. This disability is the result of excessive loss of salt in the sweat. The serum chlorides are reduced from 2% in the mild cases to 10% in severe cases. Loss of salt is necessarily associated with loss of water, otherwise the osmotic pressure would change. Farm animals that have access to salt probably never develop heat cramps because, unlike humans, animals develop a salt craving and consequently satisfy the salt need.

Keeping Warm in Cold Weather. Unlike protection against heat, protection against cold is not influenced importantly by humidity, because heat dissipation in cold weather is mostly by radiation and convection, and but slightly by vaporization (Fig. 3), although below 45F, humid air feels colder than dry air because the conductivity of the clothing is increased. The body has more defenses against injurious effects of cold than of hot environments.

If the temperature is gradually lowered, as occurs in nature with change in season, the animal reacts to the change by developing various types of insulating coatings, such as wool, mohair, feathers, bristles, or subcutaneous fat, which are, incidentally, also important agricultural products. Certain behavior patterns are adapted to preserve body heat, such as curling up, covering up, seeking shelter, seeking sunlight, huddling together (so-called social temperature regulation).

When the temperature decline is rapid, nervous mechanisms are called upon, such as those involved in contracting the surface blood vessels, thus removing the blood from the surface and protecting it from cooling.

If the above physical methods of thermoregulation are not adequate for maintenance of normal body temperature, then chemical mechanisms are employed, namely, increased heat production due to tensing of muscles, shivering, increased voluntary exercise, and also increased production of metabolic hormones, particularly adrenalin for more rapid environmental changes, and thyroxin for slower environmental changes.

Ease of keeping warm in a cold environment depends on several other factors, of which body size is one. It

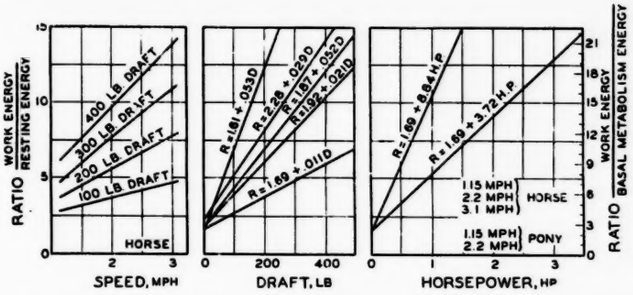


Fig. 8. The rise of heat production in a large horse and small pony with increasing rate of work.

seems that since heat loss is by way of the surface area, and since the ratio of surface area to body weight decreases with increasing size of animals, the larger the animal, other conditions being the same, the less heat it loses in comparison to its weight, and the easier it can keep warm in a cold environment. The influence of body size on heat production at different temperatures is illustrated by Fig. 5.

For any particular animal, the thermoneutrality zone will obviously depend on season (that is, temperature to which the animal is acclimatized), humidity, air movement, and other factors such as species, age, sex, state of nutrition, state of health, and so on.

As the environmental temperature is lowered or raised on each side of this zone of thermoneutrality, the heat production is increased. Increase in heat production, especially with the decrease in environmental temperature, is, on the average, more rapid in small than large animals. Note also that if the animal is adapted to live at a low temperature, it produces more heat at any temperature than if it is adapted to live at a higher temperature. It takes time to change the organic thermostat from one to another heat-producing level.

Diagrammatic Summary of Thermoregulation. What happens if the environmental temperature continues to increase or to decrease? Obviously, sooner or later, the environmental temperature will become too cold or too hot for the animal to survive and it will collapse.

Fig. 6 illustrates in diagrammatic manner how the situation works out. There is a zone of thermoneutrality between the environmental temperatures B′ and B, with the theoretical point of thermoneutrality at temperature A. If there is any thermoregulation between B′ and B, it is physical, that is, the change in heat production (chemical temperature regulation) is inappreciable. The body temperature remains nearly constant between the environmental temperatures C and B′; declines when the environmental temperature is lowered from C to E′; and rises when the environmental temperature rises from B to E.

The environmental temperature range A to E′ (thermoneutrality to fatal cold) is very much wider than temperature range A to E (thermoneutrality to fatal heat); that is, the adaptive powers to cold are very much greater than to heat. This is particularly true of the nonsweating, furry, relatively large animals such as sheep, cattle, and dogs. Practically, this means that it is not so difficult or important to protect an animal from cold as from heat.

As previously noted, the temperature regulation in the comfort zone BB′ is by physical methods, the change in heat production being inappreciable. Beyond BB′ there is increased heat production with decreasing or increasing environmental temperature. However, there is a radical difference in the causative mechanisms for the rise in heat production with declining and rising environmental temperature. The rise in heat production between B′ and D (decline in environmental temperature) is biologically desirable — is indeed a physiologic adaptation in order to maintain the body temperature constant; while the rise in heat production between B and E is biologically harmful, taking place in spite of its harmful effect, as a physico-chemical necessity.

Thermal adaptability of an animal is measured by the ratio of maximum (summit metabolism) heat production of Giaja at environmental temperature D in

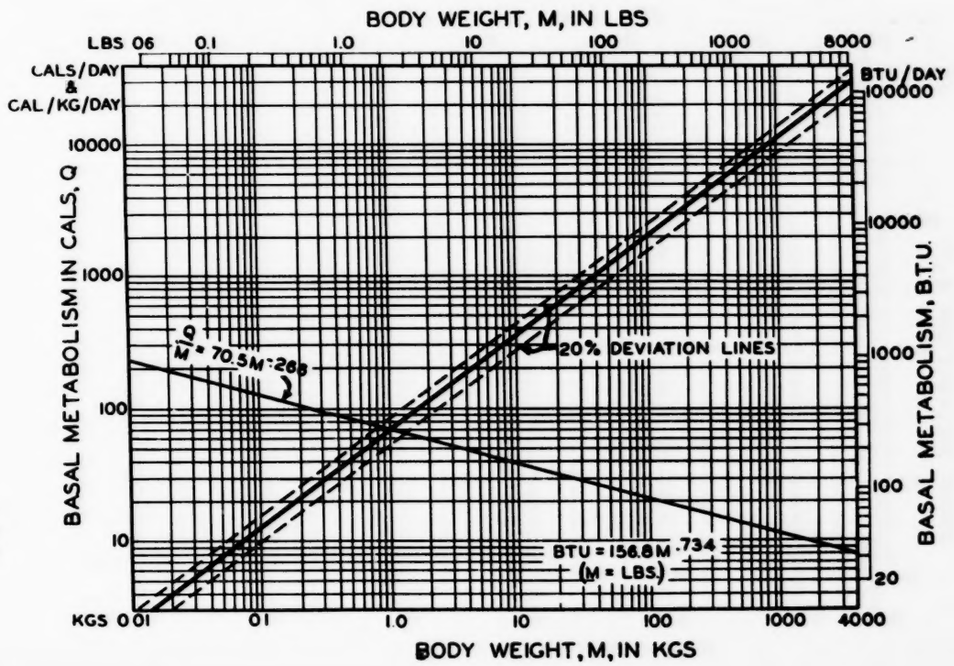


Fig. 9. The relation between basal heat production and body weight of mature animals of different species.

Fig. 6 to basal heat production at environmental temperature A.

There are great species differences in the ratio, summit metabolism to basal metabolism. There are also great age differences in this ratio. There is no need for adaptability before birth because this is taken care of by the mother. Following birth the adaptability is gradually developed with the assistance of the mother, who tides over periods of chilly spells. Birth or hatching normally occurs during seasons of the year when the environmental temperature is optimal for survival of young. When hatching or birth is adjusted to occur at some other season of the year, the breeder has the problem of supplying artificial heat, as for example, for brooding chicks.

There is a steady decrease in the temperature range in which animals can survive (that is, in the ratio of summit to basal metabolism) following the prime of life. It has been long known that heat production (basal metabolism) decreases with aging. Lessened adaptability to heat is probably due to degenerative changes in the skin, with its sweat and sebaceous glands and other cooling mechanisms, and to sclerosis of surface blood vessels.

Heat Increments of Feeding and Working in Thermoregulation

All productive processes, such as milk and egg production, necessarily involve extra feed consumption, and therefore all productive processes necessarily have heat increments of feeding (Fig. 7) in addition to possible heat increments of "making" milk, egg, meat, etc. Even mere maintenance feeding involves extra heat production. Highly unbalanced feeds, such as straw or poor hay, have particularly high heat increments of feeding. They are therefore useful for wintering animals, to keep them warm, although of course such feeds are useless for productive purposes.

The above discussion makes it evident that large farm animals with access to plenty of feed are not likely to suffer from winter cold in most localities of this country. Heat increments of feeding and working (Fig. 8) should be reduced in the summer by avoiding unbalanced ratios and physical exertion in the heat of the day.

Influence of Body Size on Heat Production. A 200-lb. animal produces not twice as much heat as a 100-lb. animal, but only about one and two-thirds times as much. This is illustrated in Fig. 9 for animals under basal conditions. Under normal maintenance conditions the heat production may be 50% above the basal level, depending of course on the activity level under the basal conditions. Under productive conditions, such as lactation, gestation, growth, muscular work, the heat production is till greater, depending on the level of productivity and feed consumption as previously explained. The important idea is that the heat production, no matter on what level, is not directly proportional to body weight, but to about the 0.73 power of body weight.

Freezing of Water Pipes

An investigation of the bursting of water pipes due to freezing was conducted by the British Non-Ferrous Metals Research Association during a number of years starting in 1931 with the object of determining methods of avoiding pipe damage due to freezing. A report of the results of this investigation was made before a British Waterworks Association meeting held in London.

It was found that the freezing of water is accompanied by an expansion of approximately 9% by volume. This expansion due to ice formation must be taken up in one of three ways: (1) by the unrestricted movement of water along the pipes, (2) by the expansion of pipes, or (3) by the escape of water from the pipe due to the pipe bursting.

When the water is allowed to expand along the pipe, freezing frequently will take place without any distortion of the pipes. Trouble arises where the freezing water is trapped in a closed section as for example between a closed tap and immovable ice plug.

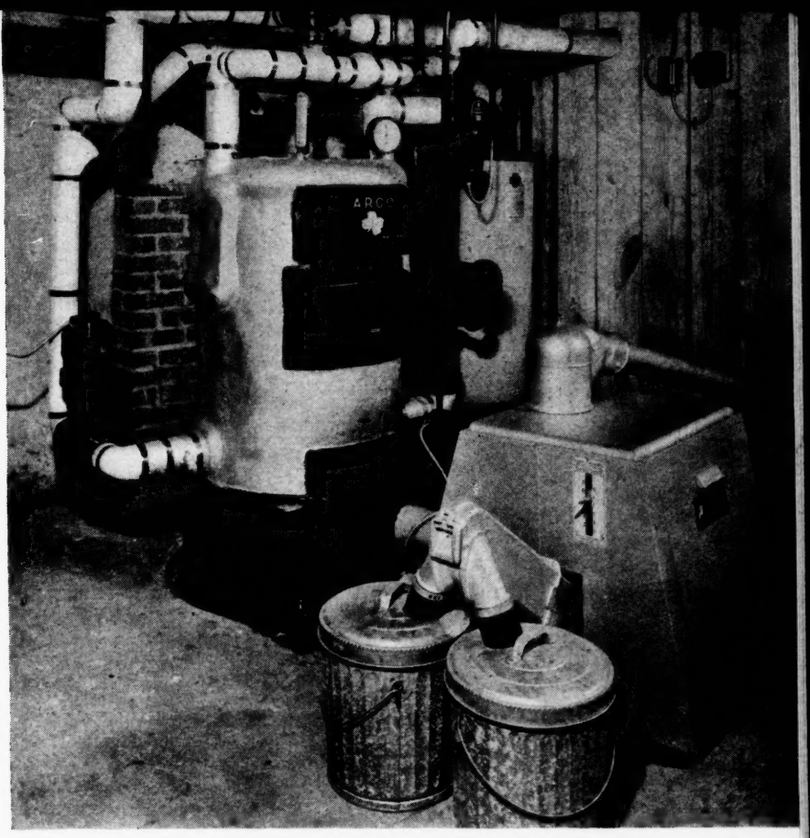
From time to time different pipe materials have been suggested as being resistant to frost bursting. A considerable amount of experimental work has been carried out to test this suggestion and selected materials of different mechanical properties have been selected for examination. Materials tested included both hard and soft copper, lead, and various lead alloys. The investigators found that the use of pipe materials of high ductility, chosen to accommodate expansion due to ice formation by expansion of the actual pipe, is not a practical method of overcoming the trouble of frost bursting, because in most cases freezing will start at one end of the pipe and the maximum expansion will occur at the end of the pipe in which the water is last to freeze. Under these conditions the concentration of expansion toward one end of a length of frozen pipe may cause even a ductile material to burst at this end after only one freezing.

The conclusions of the investigators were as follows:

1. The material of the pipe is of secondary importance as compared with the installation layout.
2. Where it is impossible to avoid installing a water pipe in a position which might result in freezing, the pipe should be protected by wrapping, or by boxing in (as by wood casing) or both.
3. Pipes which are exposed to frost are more liable to burst as freezing proceeds along the pipe towards a closed tap or stopcock. In cases where the complete prevention of freezing is impossible, protection should be so arranged to insure that freezing proceeds towards an open tap, main, or supply tank.

Thus, the only completely effective method of avoiding frost bursting is to prevent the formation of ice in water pipes, although damage resulting from freezing may be minimized as indicated.

RALPH A. KRAUSS,
Combustion Engineer, of the Anthracite Industries Laboratory,
gives full information on making a preliminary survey, selecting the proper size stoker, installation methods and adjustment in this article on



How Anthracite Stokers Should be Installed

TO understand the installation of an anthracite stoker it must be thought of both as a piece of machinery and as a means for releasing heat in the most effective manner. As a machine it must run quietly and surely, with a very minimum of attention if possible—no more than periodic lubrication. That means that it must be set accurately, level, and firmly in place, yet isolated by soft, vibration-absorbing cushions from the boiler or furnace, so that no reverberations will be set up in the heating system. Clearances between the moving parts of the stoker and the stationary parts of the boiler must be adequate, space must be provided for the free discharge of ash, and provision must be made for inspection and possible replacement of worn parts.

For the convenience of the user, the coal and ash-conveying systems must be placed so as not to block passageways, yet afford easy access.

For effectiveness and efficiency (the two are often confused) the retort must be so located as to permit the heating surfaces to absorb the maximum percentage of the heat released. Baffles are often needed to increase the boiler efficiency and reduce fly-ash.

Finally, the controls must be so placed and adjusted that the proper quantity of heat is made available as needed, without danger of the fire becoming extinguished.

That the fulfillment of these conditions is not ordinarily difficult is attested by the thousands of anthracite stokers which have now been giving excellent and satisfactory service for years, installed with only a reasonable amount of mechanical ability and common sense.

The purpose of the preliminary survey is to find out: whether a stoker will give the desired results; how big a stoker the job will need; what type of stoker will best fit into the basement plan; how the stoker is to be installed; how much the job will cost.

All of these items should be decided upon before the installation is started; in fact, they are all necessary in order to arrive at a cost estimate, in which are also included such extras as summer-winter hot water hook-ups, special controls, repairs, renovations, and replacements to the heating system. For example, in the case of a warm-air heating system without cold-air returns, it is imperative that recirculating ducts be installed in the interest of comfort and efficiency.

Most of this is real engineering. The wrong decision on any item may lead to serious consequences for the contractor, so that it is palpably foolish to leave this part in the hands of an inexperienced man, or worse yet, a salesman hired hurriedly on a straight commission basis.

Whether a stoker will be found satisfactory depends upon what is expected of it. Ordinarily, it will afford clean, uniform, healthful heat, and usually save labor and fuel, but it most emphatically will not do many things which the prospective purchaser often expects it to, such as the total elimination of ash, or keeping a sun-porch from getting overheated on a sunny day in midwinter, or providing a plentiful supply of hot water the year round in a warm-air furnace. Proper selling can overcome these misconceptions, with a great deal more subsequent satisfaction.

The survey should first determine whether satisfactory results have been obtained with the existing equipment or, if not, just where the deficiencies lie. A careful investigation based upon both questioning and

a heat-loss calculation will often reveal inadequate radiation in certain rooms. Sometimes, however, the better answer is to use weather-stripping or storm sash. Again, return ducts may be the correct solution in the case of old-fashioned warm-air systems. Human nature being what it is, a stoker installation will surely be less highly regarded in the estimation of the purchaser if these items are left overlooked or uncorrected.

Size of Stoker. The size of the stoker required may be determined roughly by the annual coal consumption previously experienced. On the average, the annual tonnage plus 25% is the required burning rate in pounds per hour at the maximum demand. A much safer procedure, however, is to calculate the heat loss of the building (the radiation count is often misleading) and work from the resulting figure. Dividing the total B.t.u. per hour by 5000 will give the required coal feed, allowing for all factors of safety and a reasonable efficiency.

If the radiation count is taken also, divide the square feet of standing radiation by 25 for steam, or 40 for hot water, to obtain a check figure on the feed rate.

It is usually misleading to use the *boiler rating* for determining the stoker size. Should the boiler rating exceed the load requirements, higher efficiency will be secured by setting the burning rate to meet the load; and if the boiler is undersized, installing an undersized stoker will merely make a bad matter worse. Ratings of domestic heating boilers are based upon hand-fired performance, and the stoker will often alter the picture materially.

Too small a boiler handicaps the stoker by allowing too high a stack loss to occur. Within limits, this may be counteracted by the installation of baffles. While this and every other means should be used to obtain high efficiency, it does not follow that an undersized boiler will prevent the stoker from carrying the load, although the efficiency will be somewhat reduced.

Now, knowing how much coal the stoker must be capable of burning, it remains to be determined how large the retort need be. While too small a retort is handicapped from the start, too large a retort is likewise inefficient. The final choice depends upon a number of factors, including the space available, the size of the coal (buckwheat or rice), and the design of the retort. Any universal table must be accepted with certain reservations; however, the author believes that the following should be useful:

Retort Diameter Inches	Coal Feed, Pounds per Hour		
	Minimum	Maximum	
		Rice	No. 1 Buck
11	7	10	10
12	8½	12	12
13	10	15	15
14	12	18	18
15	14	20	20
16	16	24	24
17	18	27	27
18	21	32	36
19	24	36	40
20	27	40	45
21	30	45	50
22	33	—	55
23	36	—	63
24	40	—	70

If the manufacturer gives more specific figures, they are to be preferred.

Space Required. The next question is whether there is sufficient space in the firebox to accommodate the stoker. The free spill-over of the ash will require at least 2½ in. of space all around the edge of the retort (3½ in. for feeds of 30 to 50 lb. per hr. and 4½ in. above 50 lb.), while those having rotating retorts or mechanical scrapers may get along on considerably less.

A word of caution at this point. It often happens that a stoker is installed and works freely until a fire is put in, and then, after an hour or so, the motor stalls or the shear-pin snaps. The heat of the fire has caused expansion which causes the ash-scrapers to touch the side of the boiler. Guard against this by allowing plenty of clearance at these points.

Round boilers, unless badly overloaded, almost invariably have sufficient space to accommodate the required retort, and in round warm-air furnaces this is even more universally true. Long, narrow, rectangular fireboxes are the ones which usually cause trouble from this source. In many cases it is necessary to drop the stoker retort into a pit or raise the boiler on brickwork so that the retort will be entirely below the waterlegs. In this event the ashpit walls may become overheated, radiating this excess heat to the basement and lowering the boiler output. Lining the ashpit with firebrick will effectively reduce this loss. The brick may be omitted at the points where they would interfere with the free discharge of ash.

Arrangement. The next item on the list is the correlation of the stoker with the basement plan. Hopper-feed stokers reduce this problem to its simplest terms, but today more than 75% of the domestic stokers sold are of the bin-feed type, and even the larger (semi-commercial) sizes are often fitted with bin-feeders. Aside from the limiting length of bin-feed worm (25 feet seems to be regarded as the practical maximum) there is usually the problem of placing the mechanism and feeder so as not to obstruct passageways or prevent free access to all important points. No useful rules can be given, as the variations in basement layout are endless. Fortunately the stoker manufacturers have for the most part provided very flexible arrangements of the component parts, so that in most cases little difficulty is encountered.

Placing the bin feed tube beneath the floor is possible in some stokers, and presents a method of getting across a passageway without creating an obstruction or hazard. The shallow trench should be covered with steel plates set flush with the floor, permitting inspection or removal. Mechanical ash removal, utilizing some combination of worm and elevator to deposit the ash in covered cans, is available on most domestic stokers. When this is specified, the simplest installation is through the front, removing the ashpit door and frame to obtain plenty of room. Should this place the ash cans in an undesirable location, the installation may be made through the side or rear.

For non-mechanical ash disposal without frequent shovelling, pits are coming into common use. These may be large enough to hold a bushel can or an entire season's accumulation. The latter are emptied in the

spring, usually at nominal cost; the former are built with a ramp and are closed on the outside of the boiler with a steel plate, permitting easy removal of the filled can.[1]

In small homes, usually consuming less than 10 tons annually, the purchaser may sometimes wish to save money at the expense of a little labor, by shovelling the ashes out of the existing ashpit every two or three days. While not generally recommended, this practice may be adopted if the customer insists. In such cases, about five inches clearance for the shovel must be left under the retort, and the stoker must enter the boiler from such an angle as to permit ready access to the ashpit door.

Installations in warm-air furnaces, and sometimes those in long rectangular boilers, require the use of *long* stokers, which are made for the purpose, having the mechanism about a foot farther from the retort than in the case of the standard models.

Baffles. Baffles are frequently desirable, as they fulfill two useful purposes. One is to deflect the fly-ash and cause most of it to be deposited in the ashpit. The other is to improve the heat transfer between the hot gases and the boiler walls by forcing the gases to come into frequent and intimate contact with heating surfaces. A practical baffle for a round boiler is of pancake or conical shape, located in the firebox above the retort. Down-draft tubes are another very useful form. For rectangular boilers, the curtain baffle, suspended at the rear of the firebox, is advantageous. A complete treatise on baffles is too lengthy to be included here, although more details will be given later.[2]

Making the Installation

The installation procedure should be carefully planned in order to minimize the number of trips to and from the job, and in cold weather, to insure against needless discomfort while the heating plant is temporarily out of service.

It is usually advantageous to install the controls and wiring first, as this can be done without shutting down. Other preliminary steps may include such miscellaneous carpenter work as bin outlets, sloping bin bottoms, and dustproof bin linings; holes may be cut in the boiler base where required, additions or alterations to the duct work or radiator system at least partially installed, and if there is to be an excavation under the boiler, the supporting steel beams may be set in place. If the boiler is jacketed, the casing may be removed as far as the piping will allow, and the boiler sections carefully checked for leaks and cracks through which air may enter.

To set the retort in place, the fire must be dumped and the grates removed. The retort is often too large to pass through the available opening into the firebox, and must be partially dismantled or removed from the end of the coal feed tube. The loose parts are then placed inside the boiler; it is sometimes necessary to suspend them above the retort until it is in place. Be sure to do this with dead rings and baffles which are too large to pass through the fire door.

It is usually easier to complete the baffle installation before placing the retort. The following outline is a guide to the selection of baffle shapes and sizes.

Round Fireboxes. Use a flat round or conical baffle, or down-draft tubes.

Metal or refractory baffles may be used, providing neither the baffle nor the suspension is damaged by the heat encountered.

Baffle size is important. Too small a baffle is valueless, while too large a baffle imposes too much draft resistance. Below this limit, the larger the better. If possible, first install the stoker and accurately measure the draft difference between firebox and smokehood with the stoker in full operation. Then use this table:

Draft difference (without baffle), in....	0.02	0.04	0.06	0.08	0.10
Baffle diameter (% of firebox diameter)	95.0	92.5	90.0	87.5	85.0

Locate the baffle centrally, and high enough to permit access for kindling the fire and inspection of the retort.

Warm air furnaces usually require a second baffle hung just below the top outlet of the firebox.

Down-draft tubes may be of steel conduit, usually 3-inch. Top ends are hung in the uptakes with a heavy nail, and the surrounding spaces sealed with asbestos cement. Bottom ends lie against the sides of the firebox, about three inches above the retort level. Arrangement and number should be suited to the uptakes.

Rectangular Fireboxes. Use a curtain baffle of ¼ in. steel plate, made in two pieces bolted together after being placed. Hang the baffle from the forward edge of the rear uptake, extending down to within two inches of the bottom of the water leg. Seal around the baffle with furnace cement, and seal the uptake between the sections, so that all the gases must pass under the baffle.

If the draft is sufficient, lay common bricks in the flue passes, leaving about an inch of space at the sides and top.

The stoker is now slid into position and the retort assembled. Before proceeding further, it must be checked to be sure that:

1. The top of the retort is level in both directions.
2. It is placed in the center of round fireboxes, or in rectangular fireboxes, equidistant from the two sides, and as far as possible from the uptake, but allowing sufficient space for the ash to discharge freely on all sides, and for all moving parts.
3. There are no open or leaking joints in the retort to permit air to escape into the firebox excepting through the fuel bed. This may be investigated by covering the retort face with sacking weighted with bricks, running the stoker, and exploring with a lighted candle or a wet finger.

As soon as the retort has been checked, the stoker may be started so that there will be coal in the retort, ready to kindle a fire when the installation is complete.

[1]For a more complete description of ashpits, their construction, and labor and material required, the reader is referred to Bulletins MA-1 and MA-2, issued by Anthracite Industries, Inc., Chrysler Building, New York.

[2]For the most complete and comprehensive treatise on the subject, Anthracite Industries Laboratory Bulletin L-38 is recommended.

The opening around the coal tube may now be closed. Large openings may be laid up with common brick, using asbestos cement containing 20% Portland cement for mortar. Soft asbestos or asbestos rope should be used around the coal and air tubes to prevent the transmission of vibrations to the heating system. At the coal bin, felt pads should be used between the steel and wood, to prevent dust as well.

Start the fire with charcoal, igniting it with a small handful of excelsior or torn strips of paper placed in the bottom of the retort. Do not use wood for kindling in stokers equipped with mechanical ash-removal; it may pass over partially burned and jam the worm. Kerosene is dangerous. Clean, convenient stoker kindlers may be obtained from the Anthracite Industries Laboratory at Primos, Pa., at a nominal cost. The customer will appreciate having a few on hand, although they are seldom needed.

After the kindling is well ignited, start the stoker, and cover the blazing charcoal with a shovelful of coal.

The boiler jacket may now be reassembled, minor repairs made, and the job cleaned up. By this time the fire should be in good condition, and the coal feed should be set to the predetermined quantity.

Adjusting the Stoker

To insure proper combustion, high efficiency, and adequate heating, the following adjustments must be made:

1. Setting the coal feed. This may be varied by changing pulleys, sprockets, ratchets, or gears, depending upon the particular stoker. The manufacturer usually supplies the data for setting the feed to the desired quantity. Once made, this adjustment should not be changed unless strictly necessary.

2. Air pressure. This is varied by throttles or dampers located at the inlet or outlet of the fan. As a rough guide, the air should be adjusted so that while the stoker is running continuously (for a half hour or more) the ring of dead ash around the edge of the retort is about one inch wide. Finer adjustments may be made upon the basis of flue-gas analyses and examination of the ash.

3. Draft. The stack damper or other draft regulating device should be set so that there is a *very slight* negative pressure in the firebox and throughout the boiler. Excessive draft reduces the efficiency by drawing in cold air around the fire door and through other small openings, while inadequate draft permits fly ash to escape into the basement and may also cause overheating of the retort. Changes in the stoker air pressure will usually necessitate further adjustments of the draft.

4. Controls. (a) Room thermostat. This is usually set at 72F for residences. However, individuals may prefer higher or lower settings. (b) Limit control. For steam systems this may be set at 5 lb. pressure (up to 10 lb. for large buildings) and for vapor or vacuum systems at one pound. Hot water radiation is usually designed for 180F, although for closed systems it may be as high as 220F particularly if the radiators are skimped. If, on the other hand, the radiation is generous, it may be necessary to reduce the setting to about 160F to prevent overshooting. Gravity warm-air systems without return ducts may fail to give sufficient heat unless the limit control is set up to 250F. With return ducts this may be reduced to 200F. Fan furnace systems operate on lower temperatures, but in the absence of actual figures, it is best to set the bonnet switch at 175F. (c) Hold-fire control. This function may be fulfilled by any of several instruments. Use the highest setting possible without overheating in mild weather. Timers are usually set at about one minute per half-hour, stackswitches at 200F, bonnet switches at 100F, and low-limit aquastats at 95F.

Final Check. The installation should be inspected a day or two after it is completed and started running, preferably by someone other than the installer. At this time, the owner may be questioned as to the general operation, and final adjustments made. A scheduled service call is less expensive than an emergency one, and this inspection affords an opportunity to find possible trouble before it materializes.

Checking the Flue-Gas. No installation of a stoker should be considered complete without a check of the flue-gas for CO_2 and temperature. As one of the lesser reasons, competitors are doing it and using it as an advertising point. A better reason is that many complaints of excessive fuel consumption will be avoided.

If the boiler and stoker are generous in size, little difficulty will be experienced in getting a low stack temperature and well-burned ash. In such cases, 8% CO_2 may be considered satisfactory, although it is desirable to have 10%, especially when the stack draft is reduced during the reading so as to minimize infiltration; but when the boiler is heavily loaded, the stack temperature will be higher, and although it may be reduced by using a baffle, the best efficiency will be obtained by cutting down on the air so as to obtain a higher CO_2. This usually results in an increased ashpit loss, which may cause complaints unless forestalled. Whether the owner wants to operate an efficient heating plant or an ash factory is his prerogative, but he may be guided to an intelligent decision by means of a few facts.

Modern methods of coal preparation have reduced the ash to such a small percentage that there is not enough of it to hide a relatively small quantity of unburned coal. Even with an ash which looks quite black, at least 92.5% of the coal is being burned, and to attempt to increase this figure will only result in more heat being lost up the chimney.

Without making a laboratory analysis of the ash, it is impossible to set the stoker for the absolute peak of efficiency. Fortunately, a fair amount of leeway is possible without losing more than a negligible percentage. There are so many factors in each installation that hard-and-fast rules are impossible, but as a rough guide the following may be used:

Stack Temp. F	Minimum Permissible % CO_2
400	7
500	8
600	9
700	10

Higher percentages of CO_2 than those shown, if ob-

tained without resulting in excessive ashpit loss, are of course desirable. This is particularly true if the CO_2 is raised by sealing air leaks in the boiler setting.

Instruments. A number of suitable flue-gas analyzers are on the market, and several manufacturers are supplying kits containing also a stack thermometer and draft gauge. Because the gases from an anthracite stoker contain no combustible gases, the CO_2 analysis is sufficient. Analyzers which absorb the CO_2 and register the percentage by decrease in volume or pressure of the sample are convenient, dependable, and highly recommended. Instruments of the electrical type are convenient and easy to use, but should be checked frequently against an Orsat type of analyzer.

Measurements should be taken only after the stoker has been running steadily for about a half-hour. If not, the fire will hardly be in normal condition. Measurements made upon a freshly kindled fire will usually show a higher CO_2 than normal, and conclusions should be drawn accordingly.

Conclusion. Stoker manufacturers supply their dealers with detailed instructions for installing their particular stoker, including the precautions and technique peculiar to the type. This article covers the subject in a general way, and includes pertinent points from the author's experience.

Welding Fume Control and Exhaust Hood Design Discussed

At the 5th annual meeting of the Air Hygiene Foundation, held in Pittsburgh on November 12-13, there were presented a number of papers of interest to heating and ventilating engineers. Two of the papers gave valuable information on the design and installation of exhaust systems. The first of these papers was entitled, "Control of Fumes and Gases from Arc Welding with Coated Rods," by B. D. Tebbens, and the second was, "Design of Lateral Exhaust Hoods for Industrial Tanks," by Leslie Silverman.

Mr. Tebbens reported that, in general, all welding rods and all coatings gave off a visible fume or smoke. He also noted that if welding was done at various distances from the hood, it was possible to determine at what suction velocities, measured at the arc, all visible fume and gas entered the hood. It was also possible to predict with fair accuracy the gas and fume concentration after a definite time when welding under a particular condition. Mr. Tebbens pointed out that as a result, one may write specifications for the necessary ventilation to bring about any desired condition.

As a result of these tests he reported that modern electric welding is a safe job providing the worker observes certain simple rules. He must avoid ultra-violet light from the arc, and his skin, especially the arms, face and neck must be protected. He should not weld in confined spaces, like tanks, unless they are well ventilated or unless he is supplied with an air mask. If the concentration of visible fumes is kept within reasonable limits by means of appropriate ventilation there will be no risk from poisoning from NO_2. This does not mean the NO_2 gas and visible fumes are given off in any constant ratio. They are not. But low concentration of visible fumes, such as 20-25 milligrams per cubic foot preclude any possibility of harm from breathing gaseous impurities.

The purpose of Mr. Silverman's work was to study the factors affecting hood design for single-slot unheated tanks, such as those used for cold-plating, pickling, acid-dipping, alkali baths, and wash tanks. The effect of temperature and of solvent characteristics on ventilation requirements, together with the performance of double-slot hoods, is being studied further.

Ventilation requirements (Q) of unheated tanks with lateral exhausts were found to vary as follows:

Unflanged hoods..... $Q = 2.3\ (\text{width})^{1.15}\ (\text{length})^{0.85}\ (\text{velocity})^{1}$

Flanged hoods..... $Q_f = 1.9\ (\text{width})^{1.3}\ (\text{length})^{0.7}\ (\text{velocity})^{1}$

The optimum height of flange is that equal to tank width and the optimum flange inclination is the maximum allowable without interference with industrial operations.

Slot velocity and slot width are unsatisfactory criteria of hood performance. The important factor is the quantity of air handled.

The depth of liquid surface below the slot does not affect greatly the characteristics of hood performance, but may have an important effect on evaporation and entrainment of liquid.

Among the other papers presented were:

"Individual Susceptibility to Toxic Dusts," by Dr. Leroy U. Gardner.

"Further Developments in the Study of Effects of Toxic Materials on Living Tissue as Observed in the Living Mammal," by Darrow Haagensen.

"Activities of U. S. Public Health Service in the Defense Program," by Dr. P. A. Neal, Division of Industrial Hygiene, National Institute of Health.

"Health of Electric Arc Welders in the National Defense Program," by Gordon C. Harrols, Ph.D., Stuart F. Meek, M.D., Carey P. McCord, M.D., Industrial Health Conservancy Laboratories.

"Industrial Hygiene and the Navy in National Defense," by Captain Ernest W. Brown, (MC) USN Navy Yard, New York.

"Absorption and Excretion of Volatile Solvents," by Dr. Howard W. Haggard, Yale University.

"Protection of Civilians in War," by W. P. Yant, Mine Safety Appliances Co.

Theory Vs. Practice

Infiltration

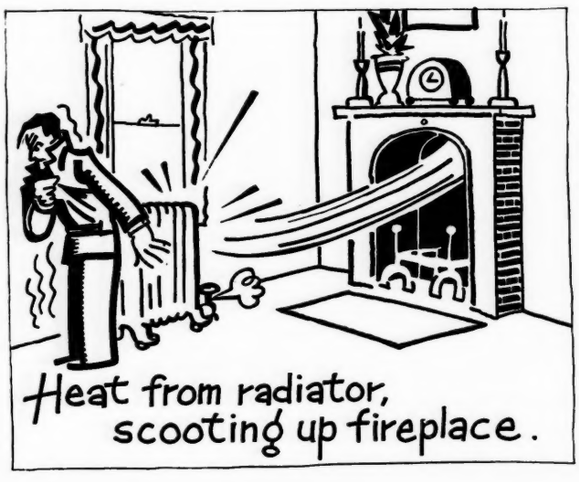
By T. W. REYNOLDS

ONE will often find a theoretically undersized radiator satisfactorily heating the room in which it is located, or possibly some other radiator not heating the room in which it is placed, even though this radiator is oversize according to accepted figures. Contradictions, such as these, and violations in actual practice of our most sacred engineering laws start us thinking, for there is nothing that the engineer cherishes more than a set of definite figures. Figures are better than guesses and should be used, but with alterations or extensions as judgment and experience dictate.

Any attempt to design a heating plant in accordance with the worst combination of all of the variable factors that enter into the problem will produce an oversize heating plant, as it is seldom, if ever, that the most unfavorable combinations of temperature, wind velocity, and lack of sunshine occur, or remain long in combination when they do occur, since the outside conditions are changing constantly. Extreme precision in the calculation of heat losses is therefore hard to obtain.

Actual wind direction for a particular house may not correspond to the prevailing wind for the general locality as given by the Weather Bureau due to deflection of wind currents by surrounding buildings, or wind pressure may force warm air to the rooms on the leeward side. Wind movement, of course, not only increases the air infiltration, but also the heat transmission of walls, glass and roof, affecting poorer walls to a greater extent, because the wiping effect of the wind quickly removes any protective film of warm air tending to cling to the outside surfaces, thus lowering their outside temperature and increasing the temperature differential between inside and outside surfaces of the walls. This in turn lowers the temperature of the indoor side of the wall, so that higher temperatures in the room become desirable for the same degree of comfort.

We may also find warm air readily rising through an open stairwell to overheat the second floor, or this second floor may be underheated due to the use of a fireplace on the lower floor, providing an easy exit and relief of air pressure within the house, so that cold air will more readily enter window cracks of the upper floor and flow down the open stairwell. A desirable balance between the satisfactory heating of the two floors will likewise be found wanting if the lower floor is protected by considerable shrubbery, or by nearby one-story buildings which leave the second floor exposed.



Just how accurate or inaccurate our methods of figuring air infiltration are is a question which can stand a little airing, irrespective of whether the air infiltration quantity is obtained by the lineal feet of crack or by the long-used arbitrary rule of air change. The writer never had any great faith in either method, except that the air change method seems to give fair results in the case of rooms of average size and normal glass exposure. In other cases, this method must be used with judgment. For example, it is apparent that a room with a 10 ft. exposure and depth of 20 ft. should have the same infiltration of air that this same space would have were its depth cut in half by a closed partition, so as to make two rooms of equal size out of the former room.

Of course, the safest method is to figure the air infiltration by both methods and set down the result which in each case is the larger of the two, though in some cases this will give startling results. The air change method will give more radiator surface than is required in the usual old brownstone front dwelling of New York with its great depth, high ceilings, party walls and the usual two abbreviated exposures at front or rear, one of which is usually south. On the other hand, the use of the crack method for rooms having only one very small window will result in radiators of such small size that our common sense tells us to discard the figure. Another difficulty with the crack method is that it fails to allow for air infiltration which takes place through the cracks in old or poor construction, either where the wall meets floor and ceiling or else at some other joint.

The short term "crack method" refers of course to authoritative data as published in standard handbooks on infiltration of air through various types of windows expressed in cubic feet per foot of crack per hour as based on tests at a wind velocity of 15 miles per hour. The figures given for double-hung wood sash windows are for the unlocked condition, and all such values

of leakage for the average window are for windows with the average measured crack of 1/16 in. and clearance of 3/64 in. as found in a field survey of approximately 600 windows under heating season conditions.

These data have been established on a rational basis and give one something to start with, but leave one with the burden of determining each individual window conditions in the field and of knowing a condition when one meets it, for it is possible to have a window with average crack and clearance, yet with a leakage of at least twice that of the figure given. The variables are many and depend upon how the window deteriorates with time, how the window is closed or fits when it is closed, whether the sash is short, the meeting rail members warped, the frame and sash fitted squarely to each other, and whether or not the frames are properly caulked or grouted.

Locking a wood casement window will usually decrease the air leakage by a substantial amount, and locking a double-hung window, especially one with a large clearance, will as a rule also decrease the amount of leakage, though the locking sometimes pushes the meeting rail members apart, thus increasing the leakage. A poorly fitted window with non-weatherstripped double-hung wood sash in the unlocked condition and with 3/32 in. crack and 3/32 in. clearance will have 2.8 times the leakage of the same window having but 1/16 in. crack and 3/64 in. clearance and designated as average in published data. The leakage of a poorly fitted window may be cut in half by the application of storm sash, but the use of such sash will be of little help when applied to well-fitted windows, except in so far as it reduces the heat transmission through the window.

A Handy Clamp for Aligning Pipe

In the accompanying sketch is shown the plan for making a clamp, for aligning pipe, which involves simple and easily obtained materials and little work on the part of the welding operator.

Clamp Construction

This clamp consists primarily of two parallel plates which are connected by welding a section of angle iron sufficiently long enough to support the ends of the pipe about 6 or 8 in. back of the joint. The dimensions on the plan are for a clamp to be used on pipe up to about 3 in. diameter. If larger sizes of pipe are being used, it will be necessary to increase the sizes of the angle iron, of the base plates, and possibly also of the chains for holding the pipe in place.

The angle iron is first welded across the face of the two plates. The 3/8 in. eyes in each end of the plates are then inserted in the holes and the chains drawn over the pipe and slipped into the slots so that the links bear on the underside of the base plates. Nuts are threaded over the eyes. A small piece of welding rod can be welded onto each nut to form a handle for quick operation of the clamp.

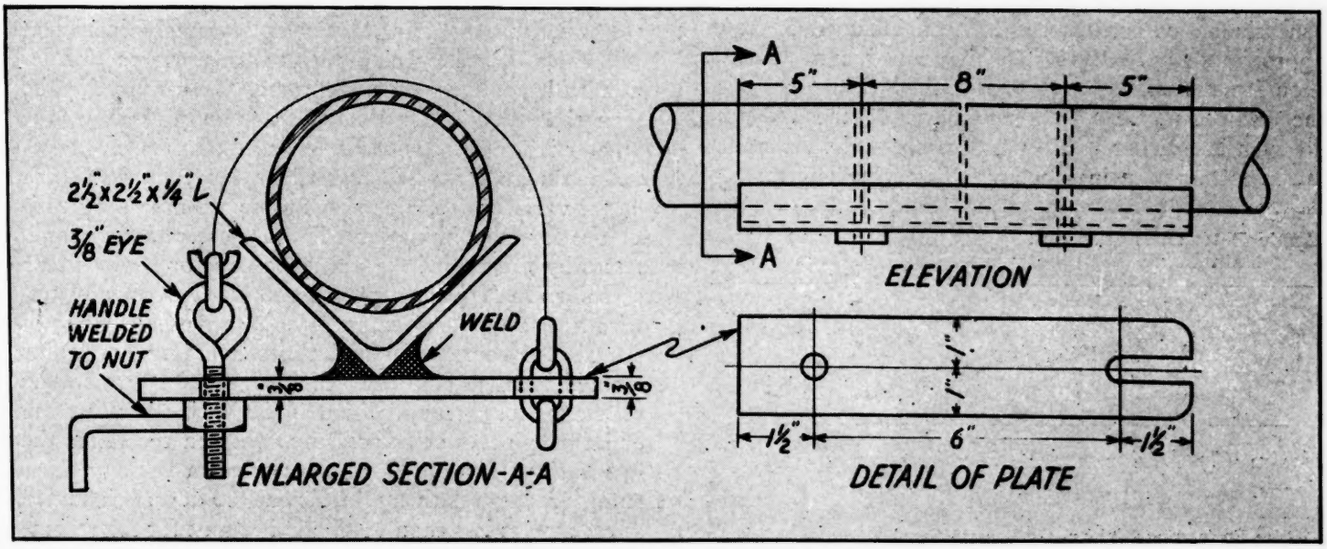
Quick Adjustment

It is a simple matter to adjust this clamp on the ends of two pipes. The pipes can be spaced by laying an 1/8 in. or 1/16 in. diameter welding rod across the two arms of the angle iron and butting the pipe up against it, then fastening the aligning clamp in place so that the proper space is thus provided. The welding rod can then be removed and tack-welds made on three places in the pipe circumference.

A modification of this clamp is shown in the photograph. This involves the use of two large C-clamp members in place of the chains. This clamp is being used for tack-welding 2½ in. pipe in the field. After the tack-welds are made, the clamp is removed and welding proceeds either by rolling the pipe or in position, as the situation requires.

This material has been abstracted from a recent issue of "Oxy-Acetylene Tips."

Sketch shows construction details of a simple clamp for aligning pipe for welding.



Economical Dust Control with Low Resistance Exhaust Systems

By F. F. KRAVATH†

PART 3 — BRANCH JUNCTIONS AND CHANGES IN PIPE SIZES

IN Fig. 5 are illustrated various junctions of main and branch pipe and the conditions of flow resulting. In "a," is shown the type of connection which, unhappily, is so prevalent today. Here the branch meets the main pipe at an angle of about 45 degrees. For reasons of fabrication the branch is introduced to the main some distance beyond the pipe enlargement, and the enlargement itself, often as not, is a short piece with an included angle of approximately 30 degrees. Much turbulence with resultant resistance to flow is the result of such an element. First, the air stream in the main must go through a diverging cone which, by virtue of its excessive included angle, causes discontinuous flow and eddy currents with resultant shock on entrance to the larger straight section. Then, the main velocity having been reduced, the air stream from the branch enters at a considerably greater velocity causing a shock loss again, and to top it off, it enters at such an unfavorable angle that discontinuous flow and turbulence result. Any junction which brings the two or more air streams together at approximately the same velocity and all going in the same direction fulfills most of the requirements of an efficient junction, especially if this is done without the formation of eddy currents or undue turbulence. "b" illustrates a junction of this sort, while "c," being rectangular is able to approach almost perfect conditions of airflow. Wherever possible, in the use of round piping, the diverging cone should be constructed with an included angle of approximately 7 degrees, while the joining branch should make an angle of no more than 15 degrees with the main centerline. On the basis of the 7-degree diverging cone, below are listed some of the resistance losses encountered in junctions of varying angles:

Angle Between Branch and Main Centerlines	Loss in % of Branch VP
15	7
30	13
45	19
60	37

Maxim (5) *Design branch junctions for utmost efficiency.*

†Office Engineering Division, the Panama Canal.

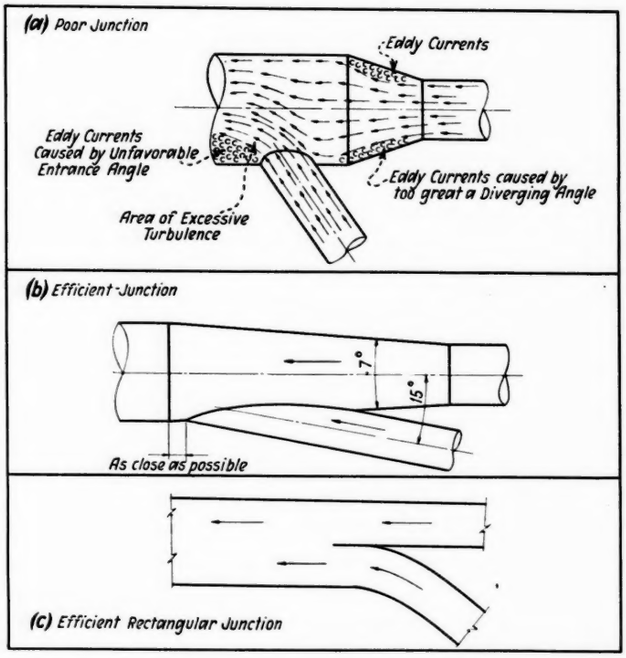


Fig. 5. Illustrating various types of junctions.

For many reasons, it is necessary, occasionally, to reduce the pipe size. This may be done abruptly, or it may be done in more efficient ways. In Fig. 6 are illustrated different methods of making reduction in pipe size and their relative efficiencies. The abrupt contraction, illustrated in "a" is an extremely inefficient element as can be seen from the eddy current formation and resultant vena contracta. It can readily be seen that the greater the variation in pipe sizes, the greater is the resultant loss. While the loss is not especially severe for small variations, as compared with larger variations in pipe sizes, when we note the possibilities for the elimination of even these relatvely small losses by the use of the diverging cone or Moss nozzle as shown in "b" and "c," it becomes economically unwise not to do so. Compare the relative efficiencies of the abrupt contraction and the converging nozzle for a small to large area ratio of 2/3. In the former, the resistance loss is approximately 50% of the upstream or larger pipe velocity pressure, while in the latter the loss varies from 13.5% of the upstream velocity pressure for the relatively inefficient 60-degree included angle cone to less than ¼ of one per cent for the recom-

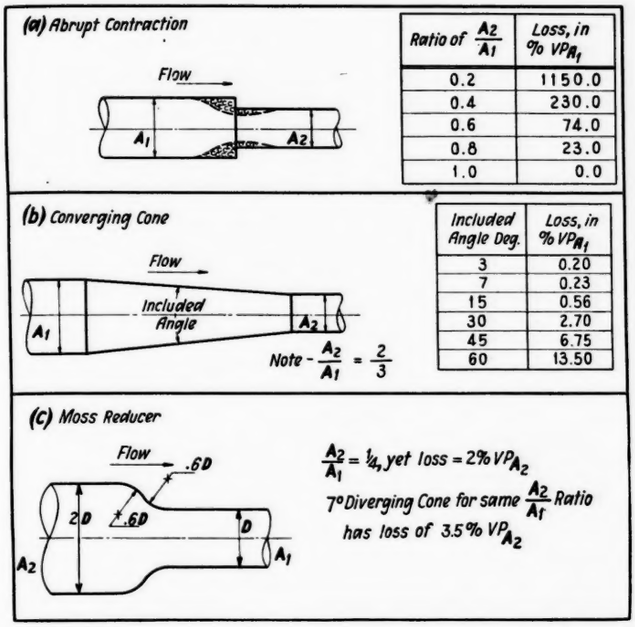


Fig. 6. Outlines and data on various forms of pipe reducers.

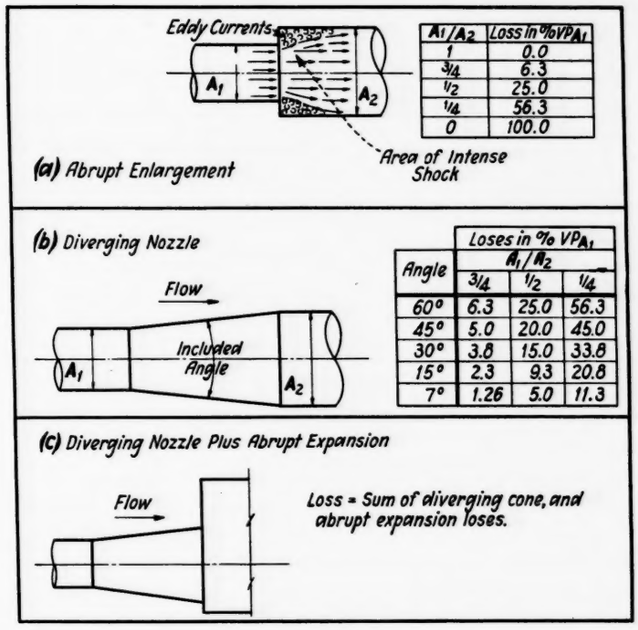

Eddy Currents
A1
A2
Area of Intense Shock
(a) Abrupt Enlargement
A1/A2 | Loss in % VPA1
1 | 0.0
3/4 | 6.3
1/2 | 25.0
1/4 | 56.3
0 | 100.0
(b) Diverging Nozzle
Flow
Included Angle
A1
A2
Angle | Loses in % VPA1 A1/A2 3/4 | 1/2 | 1/4
60° | 6.3 | 25.0 | 56.3
45° | 5.0 | 20.0 | 45.0
30° | 3.8 | 15.0 | 33.8
15° | 2.3 | 9.3 | 20.8
7° | 1.26 | 5.0 | 11.3
(c) Diverging Nozzle Plus Abrupt Expansion
Flow
Loss = Sum of diverging cone, and abrupt expansion loses.

Fig. 7. Three types of enlarging sections.

mended 7-degree cone. Typical exhaust system applications for such pieces may be in the connections to fans or the inlets to inertial or cyclonic dust separators. Here, it is necessary for the sake of efficiency in the collection of material that a relatively high inlet velocity be had, a velocity which often is considerably higher than necessary for mere transport of material. Where it is necessary that extreme reduction in pipe size be had, such as would be desirable coming out of a cyclone, where it is paramount both for the sake of low resistance and overall efficiency of collection that the exit velocity be extremely low, the Moss nozzle or reducer represents the ultimate in efficiency of transformation, the resistance loss being only 2% of the upstream velocity pressure. A 7-degree diverging cone, with the same reduction in area is only slightly less efficient, having a loss of 3.5%, but since this piece would be very long, its practicability is questionable.

As important as it is that we make efficient transformation of velocity or kinetic energy when reducing pipe sizes, it is even more important that efficient transformation be made when increasing pipe sizes, for this seems to be the more abused element of the two. In the use of chip traps, settling tanks, inertial separators, or cloth filters, it is attempted to impose a high velocity air stream in the nature of 3000 to 6000 f.p.m. on a relatively motionless body of air. This cannot be done without a violent shock loss generally as high as a full velocity pressure. Borda first expressed the loss encountered in fluid flow where there is an abrupt enlargement in pipe area, and an accompanying shock, as the head corresponding to the difference in pipe velocities in both sections. It must be stressed that this loss is not the equivalent of the difference in velocity heads in the two sections. Referring to Fig. 7, illustration "a," the resistance or shock loss encountered in a piece of this sort for any ratio of pipe sizes, $R = \left(\frac{V_1 - V_2}{4006}\right)$

or $\left(1 - \frac{A_1}{A_2}\right)^2 VP_1$

where

R = resistance loss encountered, in inches water gauge.
V_1 = Velocity in smaller pipe, in feet per minute, f.p.m.
V_2 = Velocity in larger pipe, in feet per minute, f.p.m.
A_1 = Area of cross-section of smaller pipe.
A_2 = Area of cross-section of larger pipe.
VP_1 = Velocity pressure or head in smaller pipe, in inches water gauge.

As can be seen in Fig. 7 (a), the severity of shock loss increases rapidly as the pipe size variation increases until, where the ratio of pipe to receiver area is practically zero, the loss becomes one velocity head. In mere pipe enlargements, the use of diverging nozzle, illustrated in "b," especially with the included angle 15 degrees or less, is always advantageous in reducing shock losses. Wherever possible, when it is desired to cause a relatively great reduction in pipe velocity, such as in entering filters, the included angle should not exceed 7 degrees. Here again, the piece should be long enough so that the velocity on entrance to the filter or tank does not exceed 1500 f.p.m. The velocity pressure corresponding to 1500 f.p.m. is approximately 1/8 in. W.G. so that if a full velocity pressure must be lost, at least it is very small. This point cannot be stressed too strongly, and leads us to maxim (6) *In increasing or decreasing the velocity of airflow, especially at the entrance or exit of filters, traps, or other cleaners, always make this energy change in the most efficient manner.* For information relative to proper exit pieces, refer to Fig. 3 which illustrates the various ways in which transformation may be made coming out of a hood. The theory is identical.

[*In the next installment the author will discuss filter connections and fan selection.*]

Fig. 2. Exhaust system for spray painting operation, fundamentally a local exhaust hood in a face-up position. The dilution mechanism, however, is also of importance.

Air Dilution in Industrial Ventilation

By W. C. L. HEMEON†

This is the second of a four-part series of articles by the author on the general subject of diluting contaminants in the air to reduce their concentration in industrial ventilating jobs. The third installment will appear in the February issue.

B. Spray Painting

THE spraying of paints, lacquers, etc., in spray booths presents no difficult problem. Experience has shown that air flows sufficient to create velocities of 100-150 ft. per min. through the working opening are adequate to maintain low concentrations of vapors.

In the spraying of large objects in which the workman must work inside the booth or room, velocities of this magnitude result often in very large quantities of air which may raise serious problems in heating air in winter weather.

The magnitude of air quantities required in rooms of this sort are such as to cause large reduction in concentrations of solvent by the mechanism of dilution which suggests the importance of analyzing such problems on just this basis.

Example 1: Suppose a job unadaptable to booth ventilation in which a lacquer is sprayed at an average rate of 2 gal. per hr., that it contains as its most toxic constituent, 50% toluol, and that it is desired to reduce the average atmospheric concentration of this substance to 100 p.p.m. (maximum allowable concentration 200 p.p.m.).

SOLUTION:—From Table 2, 1 pint toluol forms 3.9 cu. ft. vapor, 2 gallons lacquer per hour = 1 gallon toluol per hour (8 pints per hour).

$$\frac{8 \times 3.9}{60} = 0.53 \text{ c.f.m. toluol vapor}$$

To dilute this quantity of vapor to 100 p.p.m. will require 5,300 c.f.m. $\left(= 0.53 \times \frac{1{,}000{,}000}{100}\right)$.

This result should be compared with the quantity computed by application of the usual standard involving maintenance of a velocity of 150 ft. per min. and it is obviously greater than theoretically necessary by more than four times. However, if the nature of the job requires the workman to shift his position repeatedly over a wide area it would normally be impractical properly to localize the flow of air so that all air would be effective in the dilution process. In that case the larger air flow would be necessary.

Example 2: Consider the case of an exhaust system like that illustrated in Fig. 2, in which fumes and vapors from spraying operations are exhausted through

†Engineer, Division of Occupational Hygiene, Massachusetts Dept. of Labor and Industries.

the opening in the floor covered with a grille. The opening is 7 x 12 ft. and the lacquer sprayed is of the same composition as that in the preceding example. Calculate the necessary air flow to maintain concentrations of toluol at 100 p.p.m.

Assume that practically all of the spraying is done at a height no greater than 3 ft. and that the controlling air velocity is 75 ft. per min. (It would be impractical to induce velocities of a magnitude sufficient to deflect and control air motion directly in the spraying zone.) Then, using the method of calculation applicable to exhaust hoods, we determine the necessary air volume to satisfy those requirements.

$$Q = V(10x^2 + A)$$
$$Q = 75\ (10 \times 3^2 + 84)$$
$$= 13{,}000 \text{ c.f.m.,}$$

less 25% for the effect of the flange (floor)

$$Q = 9{,}800 \text{ c.f.m.}$$

Clearly, the same problem may be analyzed on the basis of dilution. If the rate of consumption of lacquer is the same as in the preceding example, 2 gal. per hr., then as before, an air flow of 5,300 c.f.m. would result in dilution to 100 p.p.m. of toluol vapor.

The latter is an imperfect analysis of the situation because of incomplete use in the dilution process of all air flowing. This applies to air passing near the floor and entering the exhaust opening at the edge zones. On the other hand, a considerable proportion of the vapors are withdrawn by local exhaust action, leaving a smaller amount to be diluted.

The calculation is, nevertheless, of real value since it indicates that an air flow of 9,800 c.f.m. would provide a considerable factor of safety because of the dilution effect.

Average Ventilation Rate—As has been stated, it is of greatest importance for the ventilation engineer to know what the most toxic constituents are in the coating. The common lacquers of today usually contain as their most toxic constituents toluol and butyl alcohol, with amyl acetate the most offensive to the senses. For lacquers of this general type, assuming a total solvent content of 90%, an average vapor volume of 4 cu. ft. per pint, and a maximum allowable concentration of mixed vapors of 200 p.p.m., then an air flow of 25,000 c.f.m. would be required for a rate of application of 1 pint per min., with proportionately larger or smaller ventilation rates for different spraying rates.

It must be emphasized that this standard assumes the presence of no constituents more toxic than those named, unless the amount present is so small as to prevent concentrations exceeding the maximum allowable with the stated air flow.

Lead Pigments—If the coating being sprayed contains an appreciable amount of lead as pigment, it will usually be impractical to control the hazard by dilution-ventilation. A typical lacquer contains about 3% pigment. Assuming one in which the pigment is lead chromate, it can be computed that if 10%* of the lacquer is wasted by rebound appearing thus as a mist in air, the concentration of air-borne lead would be from 10-15 milligrams per 10 cubic meters of air with a ventilation rate of 25,000 c.f.m. and a rate of application of 1 pint per min. The maximum allowable concentration for lead is 1.5 mg. per 10 cubic meters. As for spraying an oil paint containing a high proportion of lead pigment, the lead poisoning hazard is extreme and should never be attempted except with most careful control measure——booth ventilation with high velocities or by protecting the painter with an air-supplied respirator.

Spraying Rates—Rates of application vary over very wide ranges and should be obtained readily for the job under consideration. The *maximum* rate of application is determined by the human factor, rather than by the spray gun. It is estimated that under the most favorable combination of circumstances a skilled painter might apply a coating at the rate of about one pint per minute for a limited period of time. Probably one-half pint per minute is a less exceptional maximum rate under favorable circumstances.

Comparison of Two Methods—In conclusion it must be stated that the system of ventilating spray painting rooms in which the rate of air flow is such as to induce adequate velocities throughout the entire cross-section, is the more desirable method when practicable because its effectiveness is less likely to be contingent on special circumstances. Nevertheless, ventilation on the basis of dilution can be effective in some cases if careful account is taken of the factors discussed above as well as those discussed later bearing on air distribution, and it is well for the designer to take account of both methods of computation.

C. Vapor Degreasers

The ventilation requirements for these devices have been quite thoroughly worked out by investigations on the part of manufacturers and others. It has been found[2] that air flow through slots at the top edges of the degreaser tank to the extent of 60 c.f.m. per foot of tank perimeter is adequate in normal circumstances to maintain concentrations of trichlorethylene below 200 p.p.m. (the maximum allowable concentration). The *average* consumption of trichlorethylene in hand-operated, open units is about 0.05 lb. per square foot tank area per hour, according to Pokorny[3].

The necessity for avoiding undue loss of the solvent which is expensive dictates in large measure the form of the exhaust arrangement, for high velocities over the top of the tank must be avoided. Although the slot system at the edges is commonly thought of as local exhaust and doubtless is so, to some extent, a brief analysis of it on a basis of dilution will make it apparent that it may be more the latter mechanism than the former.

Consider a typical degreaser tank 3 ft. wide by 4 ft. long. On the basis of 60 c.f.m. per foot of tank perimeter it would require a total ventilation rate of $60 \times 14 = 840$ c.f.m. Take the loss in such a de-

*An average value. It may in some cases be as low as 5% or as high as 30%.

[2]Harris, W. B., Ford, C. B., Patty, F. A., Hatch, Theodore, "Trichlorethylene Degreasing Tanks and Their Safe Operation," *N. Y. Industrial Bulletin*, March, 1939.

[3]Pokorny, J., G. S. Blakeslee & Co., Chicago. Private Communication, December, 1939.

greaser to be 0.05 lb. per sq. ft. per hr., which is 0.03 c.f.m. (vapor volume of trichlorethylene from Table 2). The ratio 0.03/840 is 36 p.p.m., the concentration to which the vapor would be diluted in the absence of any local exhaust action. This is strong indication that the preponderant mechanism in such a ventilation system is that of simple dilution.

Furthermore, Pokorny[3] finds that ventilation rates of 50 c.f.m. per *square foot* of tank area results in good control. The fact that such correlation is found on a basis of tank area (concentrated vapor area) rather than on width of tank or tank perimeter, tends further to confirm this hypothesis since solvent losses were also found to be largely dependent on tank area. (The difference in calculated air flow by the two methods mentioned is too little in most cases to be of practical importance.)

When considering ventilation for a vapor degreaser, it is suggested in view of the above that inquiry be made as to the rate of consumption of solvent with due regard to the estimated proportion of time during which the apparatus is in actual operation. (Even in an active unit a time loss of 50% is not uncommon.) By computing the dilution effect as indicated above, a check is provided on the quantities of air calculated from the perimeter or the area formulas.

When due to the nature of the work a considerably greater loss of solvent appears unavoidable, a supplementary exhaust can be provided in the form of a table with a grating-top, on which the basket of work is placed and through which air is exhausted.

D. Electroplating Tanks

The common method of ventilating chrome plating tanks by exhaust slots at edges is fundamentally similar to that for vapor degreasing tanks without the solvent-loss hazard. The relatively small quantities of air found adequate to control the hazard suggest that the mechanism of dilution may play an important part.

Riley and Goldman[4] reported on the basis of a limited number of tests that a correlation between adequate control of mist and air flow through slots was obtained on the basis of the following formula:

$$Q = 100\ L \times W$$

where Q = cubic feet of air per minute needed
$L \times W$ = length times width
= area of tank

This suggests further that local exhaust action may not be the important factor in this case since the quantity of mist produced would also be expected to be roughly proportional to the tank area.

No published data appear to exist as to the quantities of chromic acid characteristically dispersed in the plating process, but one is tempted to predict that it may be found to be of the order 0.3-0.5 mg. per square foot of tank area per minute. Since 100 c.f.m. per sq. ft. has been found adequate to maintain concentrations below 0.1 milligrams per cubic meter (the maximum allowable), then a dispersion rate of 0.3 mg. per sq. ft. per min. would indicate that the dilution mechanism is preponderant, for

0.1 mg. per cu. meter = approx. 0.3 mg. per 100 cu. ft.

If, however, considerably larger amounts of chromic acid are found to be dispersed, and 100 c.f.m. per sq. ft. is confirmed as adequate ventilation, then the importance of local exhaust action would be demonstrated.

Little is known as to specific ventilation requirements for tanks in which plating of other metals takes place. It is known that in certain circumstances mechanical ventilation is necessary, but industrial hygienists have not yet identified the circumstances, irritant, or maximum allowable concentration. It is apparent, however, that in many situations dilution plays a very important part in the control of such irritant mists, for large numbers of plating rooms in industry operate safely without any mechanical ventilation or with a moderate amount of general ventilation by means of propeller fans. On the other hand operations in other plating rooms require ventilation of a high order of efficiency.

With such a scarcity of fundamental information relating to the problem, the ventilation engineer is forced to apply more liberal safety factors to his estimates than would otherwise be necessary. The task is, however, considerably simplified in cases where general ventilation has previously been attempted unsuccessfully.

In one problem in the writer's experience severely irritating concentrations resulted in a room housing several plating barrels in which zinc and brass were being deposited in different barrels. Concentrations of total cyanide of 5-6 p.p.m. (as HCN) were measured. General ventilation to the extent of approximately 1000 c.f.m. per barrel was supplied by a fan blowing fresh air into the room. It was obviously fruitless to hope to obtain satisfactory ventilation by increased dilution with fresh air since a doubling of the air flow rate at least would be required for any noticeable improvement, and even then it might be unsatisfactory. The solution was obviously in the use of local exhaust hoods. Fig. 3 illustrates the final installation in which the use of a removable cover permitted control with not over 500 c.f.m. per barrel. Similar arrangements are sometimes practical in the case of automatic or semi-automatic plating tanks in which exhausted enclosures cover the tank and are provided with suitably located inspection doors or windows.

Where such enclosures are not practical it is best to provide exhaust inlets at the edge of the tank, and until definite design data are available, the quantity of air exhausted should be estimated on the same basis as for chrome plating tanks, viz., at least 100 c.f.m. per sq. ft. of tank area.

It is earnestly to be hoped that information will be forthcoming enabling a rational specification of ventilation rates for different types of plating operations in terms of such influencing factors as bath composition, current density, plating efficiency, tank area, etc.

E. Patent Leather Manufacture

One of the principal processes in the making of patent

[4]Riley, E. C. and Goldman, F. H.—"Control of Chronic Acid Mists from Plating Tanks." *U. S. Public Health Reports*, February 5, 1937.

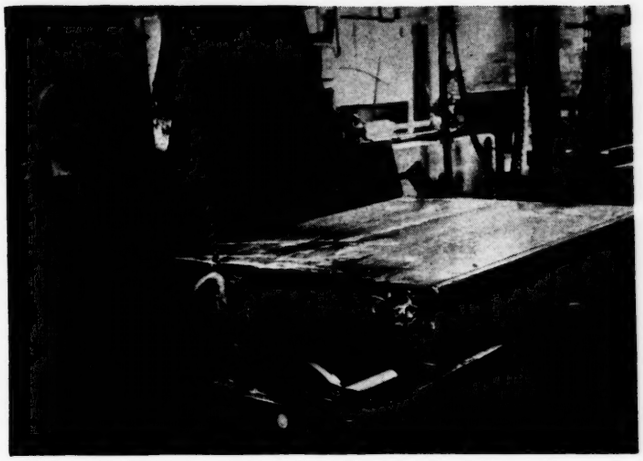


Fig. 3. Local exhaust system for plating barrel. Cover is removable. Exhaust inlet is at edge of tank under the cover.

leather is coating sides of leather with a daub of varnish-like composition containing naphtha. Evaporation of this solvent results in high concentrations of naphtha vapor in the workroom atmosphere in the absence of mechanical ventilation. A recent survey[5] of such shops showed cold weather concentrations ranging from about 1200 to 2000 p.p.m. As indicated in the code of Table 1, concentrations of 1000 p.p.m. should not be exceeded and good industrial practice would doubtless brand concentrations greater than 500 p.p.m. as unsatisfactory.

The large area over which solvents evaporate in this process makes completely impractical any system of local exhaust. Even though an arrangement of hoods were conceived that would not interfere with operations, air quantities sufficient to induce adequate controlling velocities at the source would be greater than required on the basis of dilution.

It appears that the quantity of naphtha sent into the daubing room daily in the form, principally, of daub, when divided by the number of man-hours worked equals about 1.4 gal. per hr., or 0.0231 g.p.m. Employing the methods of computation previously outlined, it develops that an air flow of 1200 c.f.m. per worker will reduce concentrations of naphtha vapor to about 500 p.p.m.

SOLUTION: From Table 2, take 3.4 as average cubic feet naphtha vapor per pint of solvent

$3.4 \times 0.0231 \times 8$ (pints per gallon) $= 0.63$ cubic feet vapor per minute

To dilute to 500 p.p.m. will require

$$0.63 \times \frac{1{,}000{,}000}{500} = 1250 \text{ c.f.m. air}$$

Thus it is specified that general ventilation should be supplied to the workroom to the extent of 1250 c.f.m. per dauber.

G. Welding

It is well known that arc and acetylene welding generate fumes that can be dangerous to life when conducted in confined spaces, as inside tanks. Cases of damage to health of welders from inhalation of fumes when working in the open are, on the other hand, uncommon.

The components of welding fumes that in some circumstances may be dangerous are the nitrous oxides. Kienitz[6] found that in oxy-acetylene welding, when acetylene was consumed at a rate of about 0.7 c.f.m., nitrous oxides were produced at a rate of 0.008 c.f.m. To dilute this quantity of gas to 10 p.p.m. (Table 1), a minimum ventilation rate of approximately 1000 c.f.m. per welder would be required. However, confirmation of these data is desirable, and final conclusions should be reserved until more complete data are available.

H. Garages

The dilution mechanism is well exemplified by the recognized standard for garage ventilation where 5000 c.f.m. of air per car in operation is specified, and 10,000 c.f.m. for a heavy truck. These figures are based on average figures for emission of carbon monoxide from car engines and on reducing concentrations to below 100 p.p.m. Higher concentrations than this are likely to cause headaches and nausea in workers exposed to them for several hours.

It is apparent that when carbon monoxide originates principally from cars that are in motion as in parking garages, resort must be had to a system of dilution-ventilation. The common source of uncertainty is in the estimation of a conservative yet adequate figure for the number of car engines in operation, but there is nothing about this problem that is not obvious. However, it is worth noting, with respect to the peak loads of short duration that occur because of the nature of this business, that fan capacity for dilution to 100 p.p.m. at those periods may not be necessary if the volume of the garage is great. The principles applying to an intermittent process of this sort are discussed later under "Effect of Room Volume."

In repair garages, on the other hand, where several car engines may be running simultaneously for test purposes, a much more economical method is to remove exhaust gases directly from the tail-pipe of the car into an exhaust system and since an air flow through a branch pipe of 50 c.f.m. suffices for this purpose, it is apparent that the dilution system requiring 5000 c.f.m. is, by comparison, prohibitive in this case.

Determining Rate of Evaporation or Dispersal

For the purposes of calculating ventilation rates the importance of learning the rate at which the contaminant is passing into the atmosphere, rate of contamination, has been demonstrated. It is not always easy to learn this rate—in some cases entirely impractical—but earnest efforts should always be made to do so.

In the use of volatile solvents one can almost always secure this information because original amounts of liquid supplied are practically always known and its universal function is to evaporate completely at some stage in the process. It is, however, advisable to check the rate of consumption by more direct inquiry, when

[5]Massachusetts Division of Occupational Hygiene, *Annual Report, 1939.*

[6]Kienitz, H. "Toedliche Vergiftungen beim Schweissen mit Acetylen," *Zeit. fuer komprimierte und fluessige Gase,* September, 1939.

possible, as by measuring the contents of a supply container before and after some definite time period. Other indirect methods will frequently suggest themselves. In some cases, the proportion of the total solvent evaporating in different stages of a process will be of sufficient importance to warrant estimating them by special means as was illustrated in example A in the preceding section.

Where an atmospheric contaminant has what might be called an *accidental origin* like the mist from electroplating tanks, or the fumes from heated lead pots, direct determination in the absence of any ventilation system is impossible. If, however, other units equipped with ventilation are available for test purposes, one can secure the desired data by measuring the concentration in the exhaust duct and the rate of air flow. The product of those two quantities, obviously, gives the rate of dispersion of the substance in question, if it appears that the exhaust is successful in removing practically all of the contaminant. Thus, if the concentration of chomic acid in an exhaust duct serving a chrome plating tank were determined to be ½ grain per cubic foot and the air flow in the duct to be 1000 c.f.m., then the rate of production of chromic acid in that case would be 500 grains per minute.

Similarly, when a system of general ventilation is in use, one can sometimes obtain the desired information by determining concentrations just in front of the fan (if an exhausting fan is employed) as the air leaves the room, noting also the capacity of the fan. The result may be unreliable if the fan capacity is small relative to the dimensions of the room or if open windows permit escape of some contaminated air at an unknown rate.

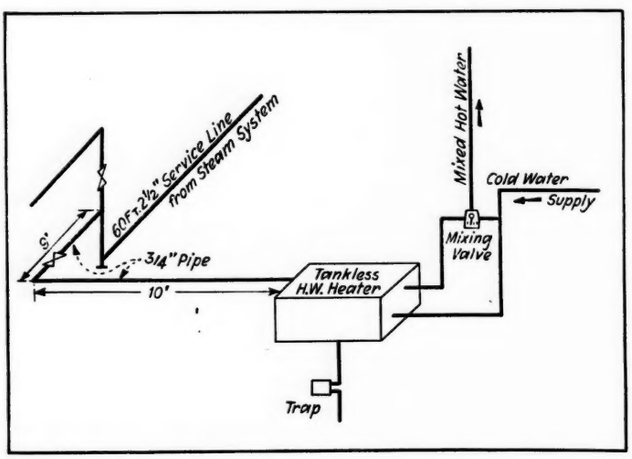
Corollary to much of the preceding is the following. If measured concentrations of an air-borne contaminant exceed the maximum allowable in a space that is under the influence of general ventilation, it is apparent that an increase in the rate of air flow will effect reductions in atmospheric concentrations that are proportional to the increase in the ventilating rate. For example, a reduction in a concentration of one-half is realized from a doubling of the ventilation rate. This, of course, applies only to average concentrations

A Water Heating Trouble Job

In connection with a heating system served by low-pressure district steam, trouble was experienced with corrosion of hot water tanks due to the fact that the city water contained about 35 p.p.m. of dissolved CO_2. It was the practice to heat the water with side arm heaters or by means of self-contained copper coils. Due to the high water temperatures in the latter, tanks deteriorated more rapidly than did those in conjunction with side arm heaters.

In order to eliminate this difficulty and secure a more desirable installation generally, tankless hot water heaters with a cast shell and copper coils were used.. A typical installation was one with a heater having a rating of 5 g.p.m. from 40F to 140F when connected below the water line of a hot water boiler with a temperature of 180F. When used with steam, it was assumed the capacity would be increased 50% so that the rating would be 7½ g.p.m. Such installations as shown on the accompanying sketch work quite satisfactorily and no corrosion is observed.

However, a recent installation on the premises of a customer of the steam utility was reported. This customer was located at the far end of the distribution system where the pressure in the alley manhole was 1½ to 2 lb. per sq. in. The service man reported everything in working order except that the heater would not deliver hot water. He installed a check valve ahead of the trap but no improvement was noticed.



Schematic diagram of service hot water hook-up used on systems where much trouble was previously caused by hot water tank corrosions.

It was suspected that the steam supply line to the heater was too small; calculations were made, and assuming a 5 g.p.m. flow the B.t.u. output per hour would be 60 x 5 x 8.33 x (140-40) which is 250,000 B.t.u. per hr. or 1042 sq. ft. of equivalent radiator surface. The heater was supplied with a ¾-in. pipe, but who would try to supply 1042 sq. ft. of radiator through 19 ft. of ¾-in. pipe?

To check the calculations a differential pressure gage was attached to the shell of the heaters to indicate internal steam pressures. The gage showed several inches of vacuum when a faucet was opened and this remained when the faucet was closed to a very light flow. The installation acted in the same manner as a condenser on the outlet of a steam turbine; the ¾-in. piping restricted the steam flow to such an extent that the cooling capacity of the coils was sufficient to produce a good vacuum in the heater.

The pipe size was increased from ¾-in. to 2 in. and no further difficulty was observed. It is hoped that this experience will help prevent similar trouble on systems where low-pressure steam is used.

—*Arthur L. Bennett.*

WATER REQUIREMENTS FOR COOLING LOADS

TABLE 1.—WATER CIRCULATION NECESSARY IN COOLING, WITH VARIOUS RISES IN WATER TEMPERATURE THROUGH THE COOLING SURFACES

Rise in Water Temperature Through Cooling Surface, (F)	Gallons per Minute (GPM) of Water	
	Necessary per 1000 B.t.u. per Hour of Cooling Load, (Mbh)	Necessary per Ton of Refrigeration Capacity, (12,000 B.t.u. per Hr.)
1.0	2.00	24.00
2.0	1.00	12.00
3.0	0.667	8.00
4.0	0.500	6.00
5.0	0.400	4.80
6.0	0.333	4.00
7.0	0.286	3.43
8.0	0.250	3.00
9.0	0.222	2.67
10.0	0.200	2.40
11.0	0.182	2.18
12.0	0.167	2.00
13.0	0.154	1.85
14.0	0.143	1.71
15.0	0.133	1.60
16.0	0.125	1.50
17.0	0.118	1.41
18.0	0.111	1.33
19.0	0.105	1.26
20.0	0.100	1.20
21.0	0.0952	1.14
22.0	0.0909	1.09
23.0	0.0869	1.04
24.0	0.0833	1.00
25.0	0.0800	0.96
Column No.	1	2

Computed at 60F, with water at 8.33 lb. per gal.

Published by HEATING & VENTILATING, *148 Lafayette St., New York.* 12/40 *Copyright, 1940, by* THE INDUSTRIAL PRESS

WATER REQUIREMENTS FOR COOLING LOADS

The table on the other side of this page is derived from the essential relationship between the quantities of heat, the weight of water heated, the rise in temperature of the heated water, and the specific heat. The basic equation can be given as

$$W = \frac{H}{\text{Sp. Ht.}\ (t_2 - t_1)}$$

where

W = Quantity of water flowing in lb. per hr.,
H = Quantity of heat in B.t.u. per hr.,
t_2 and t_1 = Degrees F water temperature before and after heating, respectively, and
Sp. Ht. = Specific heat of water.

Where water serves to conduct the heat away from warm refrigerant vapors to cause them to condense to liquids, the heat which passes from the refrigerant to the water causes the temperature of the water to rise. The table is arranged with columns showing the quantity of water (g.p.m.) necessary to conduct away from the refrigerant the heat quantities represented by the two units commonly used in air cooling practice, namely: The Mbh and the ton of refrigeration capacity. The table indicates these quantities at the increase in temperature which the water experiences in passing through the apparatus over the range usually covered in practice.

Generally, the water quantity is determined, for advance estimating purposes, by assigning some anticipated rise in the water temperature. The figure most frequently used is 10F rise in temperature and it will be seen from the table that at this capacity 0.2 g.p.m. must be circulated per 1000 B.t.u. of heat load and 2.40 g.p.m. per ton of refrigeration capacity.

The following examples illustrate the use of the table.

Example 1: How much water must be circulated through a water cooled refrigeration condenser of 11 ton capacity rating if the temperature rise of the water is 10F?

SOLUTION: Enter the table at 10 in the first column and move horizontally to column 2 and find the figure 2.40. This is the volume (g.p.m.) per ton and consequently multiplying it by 11 gives 26.4 g.p.m. as the quantity which must be circulated. It should be noted that if the temperature rise were 20F instead of 10F, the quantity of water required would be one-half of 26.4 or 13.2 g.p.m.

Example 2: How much water must be circulated through a water coil located in a stream of warm air in order to extract heat from the air equivalent to 11 tons of refrigeration effect if the temperature rise of the water is 10F?

SOLUTION: Again enter the table at 10 in the first column and proceed exactly as in Example 1. Again the water quantity will be found to be 26.4 g.p.m.

This illustrates the point that the quantity of water required to carry away a given amount of heat does not depend on the method of cooling used, since it is entirely a function of the heat quantity and the rise in temperature.

Clear distinction should be made between the figures given in the table and the *water consumption* of refrigeration condensers, or of the total quantity of water required over a period of time per unit of heat removed. The figures on Table 1 are for the quantity of water *which must be circulated* and are not necessarily the quantity of water *consumed*. In other words, there is a very definite difference between the water quantity which must be circulated and the water quantity which may be consumed. This is made obvious by keeping in mind that if the equipment is so arranged that the water which circulates through a refrigerant condenser can be re-cooled and used over again, time after time, the actual water consumption of the condenser can be zero, even though the amount of water circulated is large. Estimates of the water consumption required can be arrived at only by knowing the actual performance of the installed equipment. Generally, for air conditioning applications in many sections of the country, maximum water demands for refrigeration condensers are estimated on the basis of 2 g.p.m. being required per ton of refrigeration effect, if there is any re-circulation of water.

With well designed evaporative cooling equipment, it is possible to reduce the water consumption of refrigerant condensers to from 5 to 10% of the amounts necessary without their use.

Published by HEATING & VENTILATING, *148 Lafayette St., New York.* 12/40 *Copyright, 1940, by* THE INDUSTRIAL PRESS

Boiler and Radiator Heat Test House

is elaborately equipped to measure water flow in piping, comfort conditions and even moisture gradient through walls from central instrument board.

ADDITIONAL information is now available on the I-B-R Research Home under construction at the University of Illinois and briefly described and illustrated in last month's issue of HEATING & VENTILATING. The Home is intended for field studies with steam and water heating systems and related equipment under actual home use conditions. In summer, the home will be used for cooling research. This research program has been made possible through contributions of the Research Group of The Institute of Boiler and Radiator Manufacturers. Thirteen manufacturers have supplied the funds for construction and operation for a minimum period of three years.

The house is a six-room, two-story home with attached garage and full basement, typical of a certain class of FHA loan house. The house structure is typical brick veneer on frame construction with all outside walls and second floor ceiling insulated with full thickness (3⅝ in.) mineral wool bats. A vapor barrier, consisting of 50-pound paper applied as continuously as possible and with overlapping points to the inside of studs of all exterior walls and between house and garage, and on the bottom of the second floor ceiling joists, prevents moisture which may be contained in the room air from passing through the plaster and insulation into the walls where, in continued cold weather, there will be a possibility of its condensing on the sheathing. The exterior walls are as follows: one course face brick, an air space, building paper, ship lap sheathing on 2 x 4 in. studs, mineral wool insulation, paper, lath and plaster with troweled finish. The calculated coefficient of heat transmission for this wall section is 0.074 B.t.u. All windows and outside doors are weatherstripped. The total calculated heat loss for the house, not including the basement, is 45,900 B.t.u. per hour at —10F outdoor temperature and 70F indoors.

Since it is impossible to use thick mineral wool insulation in the radiator recesses, all with the exception of two were insulated by applying a piece of 1 in. board insulation, the same size as the recess on the outside of the sheathing. In addition, the inside surface of the recess is lined with reflective insulation. By this method of treatment the heat transfer coefficient through the wall section at the radiator recess has been reduced to approximately 0.079 B.t.u. This compares favorably with the U value of 0.074 for the fully insulated brick veneer on frame section. In order to obtain additional information on the heat loss at radiator recesses, the board insulation was omitted entirely from one recess, and in another the thickness was only ½ in.

The initial heating system now being installed in the Research Home is a forced flow one-pipe hot-water heating system. The boiler and the radiators used were selected by lot from the contributing members of the Research Group. The fittings and the circulator were also selected by lot from those commercially available. A cast-iron oil-fired boiler will be used to supply the heat. Small tube cast-iron radiators set in open recesses below the windows will transfer the heat from the water to the room air. The system has been designed to operate with 200F water entering the radiator and a 10F drop as it passes through the radiator. Removable panels of sheet-rock have been used instead of plaster on sections of the walls over all hot-water pipes to provide easy access to them. The radiator recesses have been so constructed that radiators with recess panels having inlet and outlet grilles can be used. Provision has also been made for changing the size of the recesses to accommodate radiators of different sizes with a minimum marring of the interior finish.

During the construction, approximately 100 copper-constantan thermocouples were permanently installed in the building materials to measure temperatures at important points in the structure under various operating conditions. At eight locations (two on each exposure) a complete temperature gradient through the wall can be obtained by means of these thermocouples. Other thermocouples have been installed to measure the temperature of the inside and outside surfaces of the sheathing at the center of each radiator recess. Another group of approximately 50 couples will provide for the measurement of air temperatures in each room, attic and basement, at various levels from floor to ceiling. A third group of thermocouples will make it possible to study the performance of the component parts of the heating system. In addition to determining the quantity of water being circulated through each radiator, it will be possible to measure the temperature of the water entering and leaving each radiator, and also the temperature of the water to and from the boiler.

All of the thermocouples are connected to a central switchboard in the basement where, through a system of selector switches, each one can be quickly read by means of a highly sensitive potentiometer and galvanometer. One set of wall temperature gradient couples in each of the four exposures may be connected to a ten-point recording potentiometer type of thermometer enabling one to obtain a continuous printed record of the wall temperature gradient over any desired length of time. Approximately 8 miles of copper and constantan wire have been used in the thermocouple installations.

In accordance with recommendations of the U. S. Forest Products Laboratory, moisture measuring stations are being installed in approximately 75 strategic locations in the building. The measuring stations are located in building materials where the moisture content is most likely to be critical or too high. The moisture stations are all connected through copper lead wires to a central switchboard. This information will be of paramount interest, since the moisture content of the building materials is greatly influenced by the

humidity maintained in the occupied space.

The rate of flow of water through the mains and in each radiator of the forced circulation hot water heating system may be measured by means of a sensitive differential pressure gage, or manometer, and sixteen elbow meters. The elbow meter is highly satisfactory for use in measuring the flow of water in a heating system, since it introduces no additional resistance to flow. The meter utilizes the fact that when a fluid flows through an elbow a difference in pressure exists at the inside and outside radius of the ell, and that this difference in pressure is proportional to the rate of flow.

Six 3-pen temperature recorders will be used to record the floor, breathing level, and ceiling air temperature in each of the six rooms. Other temperature recorders will make a continuous record of the attic, basement, and outdoor air temperatures. The moisture content of the air will be obtained by the use of aspirated psychrometers.

Two other interesting instruments which will be used in the Home are the thermo-integrator and the globe thermometer. These instruments not only measure the dry bulb temperature of the air, but also take into consideration the warming and chilling effects of the heated radiators and cold outside walls. The determination of the radiant effect from walls and radiators is an important factor in evaluating the true comfort level of a heated room.

Ammonia Air Conditioning Plant Cools an Indian Gold Mine

An air conditioning plant has just been installed in one of the deepest mines in the world. This is the Ooregum Gold Mine in which the present bottom level is at 8330 ft. vertically below surface. At a vertical depth of 8000 ft. the initial rock temperature is 134F. This rock temperature increases approximately 9F for each additional 1000 ft. of depth. The mean annual surface temperature is 75.6F dry bulb and 65.7F wet bulb, with a mean daily range of 19.8F dry bulb and 5.3F wet bulb temperature. To improve working conditions in this mine, the plant installed an ammonia refrigeration unit which cools 10,000 lb. of air per min. from an intake wet bulb temperature of 73F to 43F (saturated), equivalent to 13,674,000, B.t.u. per hour.

The mine is divided vertically into two sections: Bullen's to the north and Oakley's to the south. Bullen's section is served by a vertical shaft to the 42nd level, and a steeply inclined shaft thence to the bottom (88th level). Oakley's section is served by a vertical shaft to the 52nd level, and by Auxiliary shaft (vertical) to the bottom, which, at the time of writing, was the 90th level.

From the ventilation point of view, the sections are kept separate by means of a seal down the dip dividing the two. This seal consists of ground which has not been stoped, partly owing to a fault that lies conveniently between the sections, and partly owing to patches of low grade reef. Each level through this seal is equipped with two steel ventilation doors.

At the south end of the mine is a third vertical shaft, known as Circular shaft, which connects the surface with Auxiliary shaft at the 52nd level. It is 18 ft. in diameter, brick lined, and is not equipped, being used solely as an airway. This is the downcast shaft, and the conditioning plant is located at the top.

As all the hoisting shafts are upcast and therefore liable to become filled with fumes in case of fire, a good scheme for evacuating the mine, in case of such an eventuality, is essential. As soon as information of the occurrence of fire is received, eucalyptus oil is fed into all air mains at surface, and into the ventilating air currents at strategic points. On perceiving the smell, all men are instructed to leave the mine, either by exits into adjacent mines to north and south, or by shafts. This method of giving warning has been proved to be rapid and most satisfactory in action.

The ventilation can be rapidly reversed by running the propeller fan backwards. To stop and start it in reverse takes only three minutes, and for this no doors need be altered. The power of this fan in reverse is sufficient to extract ammonia fumes which might conceivably enter the shaft in the event of an accident to the cooling plant, but is not enough to be regarded as adequate for complete reversal of the whole mine ventilation circuit, as might be required when fighting a major fire underground. So, in the event of a fire in the downcast shaft, the fan is used to reverse the air. This handles so much more air that a few short circuits, caused by doors left open (as might easily happen in an emergency) would not prevent complete reversal of the mine ventilation.

Before the plant was installed, temperatures and humidity were high, and conditions underground were exceedingly trying. Such a depth had been reached that temperatures in development sections, and in stopes, rendered both the labor and the supervision extremely inefficient. In development, temperatures of 118F dry bulb and 95F wet bulb were commonly found, and the average temperatures in the airways in the stoping sections were 118F dry and 93F wet bulb, the stopes themselves showing a still higher wet bulb temperature. In the worst ventilated ends and stopes, wet bulb temperatures approached 97F. Under these conditions it is not surprising that it was found impossible to keep up the compressed air pressure owing to *blowing off*. As a result development footages fell to low figures.

Within a few days of starting up the cooling plant, working conditions improved greatly. Within two months development footage had risen from 1000 to 1400 ft. per month without any change in the number of ends working. The improvement in working conditions caused great satisfaction amongst the miners. A tendency to come up earlier owing to finishing their tasks quickly had to be discouraged, and those tasks slowly increased. For months the staff were besieged by all the spare labor on the field, seeking jobs on the Ooregum mine. Not a man was taken on for five months, however, as no replacement labor was needed.

How to Determine Size and Cost of Freon Lines

By WILLIAM PARKERSON

In two previous parts to this article, published in October and November, the author has presented six charts which make possible the quick and easy selection of the proper size refrigerant lines. In this article he shows how these charts can be used for solving a practical air conditioning problem.

Cost of Materials

IN Part I support was given for the contention that six is the most probable number of elbows in a refrigerant line. Consequently six was the number of elbows fixed upon for the curves to be presented herein. With this in mind, and remembering that the tonnage and equivalent length of line together fix the size of the line, it should not be difficult to draw a set of curves giving the cost of the materials required for such a line.

Obviously, the total cost of pipe and elbows C, less the cost of the elbows C_e, leaves an amount which represents the cost of straight pipe. If this difference be divided by the unit cost of straight pipe C_t, the quotient represents the length of straight pipe contributing to the total cost. This may be expressed as follows:

$$L_m = \frac{C - C_e}{C_t}$$

But

$$L = L_m + L_e$$

or

$$L = \frac{C - C_e}{C_t} + L_e \quad \ldots\ldots\ldots\ldots (26)$$

Table X is the numerical development of equation twenty-six. The third column gives values for C_e, the fourth column gives values for L_e, the fifth column, values for C_t and the last seven columns give values of L for various values of C. When the figures in the last seven columns of Table X are plotted, the desired cost curves are obtained.

As pointed out in Part I, the curves presented herein, including the cost curves, are based on a simple piping system as illustrated. However, whenever one or more of the main refrigerant lines break down into multiple branches at any of the units, the following percentages should be added to the total cost of pipe and elbows, to cover the cost of additional fittings:

For multiple compressor connections, add 8 % of total cost.
For multiple evaporator connections, add 6 % of total cost.
For multiple condenser connections, add 4 % of total cost.

Obviously, these are only rough approximations, but will be found sufficiently accurate for estimating purposes.

Finally, it must be kept in mind that the cost figures and curves herein are based on quoted prices as of May 7, 1940, and should be adjusted with the rising and falling prices of copper.

General

In the article by Gygax and Willson already mentioned, the effect of oil, in the design of refrigerant lines, is very clearly brought out and demonstrated. As pointed out by the authors, "in suction lines, because of the tremendous increase in volume of the refrigerant on vaporizing, the volume of oil compared to refrigerant gas is small and is normally of negligible importance as far as pressure drop is concerned." This same is true of hot-gas lines as well. However, oil plays a very important role in the sizing of liquid lines for the threefold reason that the viscosity, the specific volume, and the refrigerating effect of the refrigerant-oil mixture are all quite different from those of the pure refrigerant. The net result of the presence of oil in the liquid line is to reduce the capacity that may be transmitted through a line of a given size and length with a given friction loss.

It is already evident from the context that this paper, while not unappreciative of this situation, has made no attempt to incorporate this design principle in the curves or equations for liquid line sizing. This, for three reasons:

1. Hesitancy to further involve an already too involved subject;
2. Negligibility of the effect on the two vapor lines, which must be accurately sized on account of both cost and vapor velocity;
3. Advisability of over-sizing the liquid line in view of its relatively low cost, the danger of flash gas creation if under-sized, and the absence of any oil movement problem.

It is, therefore, recommended that, in using the developed curves, the engineer be liberal in liquid line selection, preferably erring on the *too-large* side.

Application

In conclusion, there remains only the working out of a practical example to illustrate the facility with which the developed curves may be put to service.

Let us assume that the evaporator coil has just been selected to give 30 tons of refrigeration with a 40F refrigerant temperature. Then, remembering that all lines are to be designed for a 2F friction drop, we see that the suction temperature at the compressor will be 38F. Based on this 38F suction temperature, we may find, in selecting the condenser, that the condensing temperature will be 105F. This will give a discharge temperature of 107F at the compressor and the compressor

must, therefore, be selected to give 30 tons of refrigeration at 38F suction and 107F discharge.

Now as to the refrigerant lines. For convenience, let us assume that each line contains 40 ft. of straight pipe and six elbows. Then, on curve 2, following the 30 ton line vertically upward to its intersection with the horizontal 40 ft. line, we see that we are beyond the 2⅛ in. O.D. line capacity. We will, therefore, have to go to a 2⅝ in. O.D., for which the allowance for six elbows is 37 ft. Thus, the total equivalent length of our suction line is 77 ft. This still is all right with a 2⅝ in. O.D. line and we, therefore, select that size.

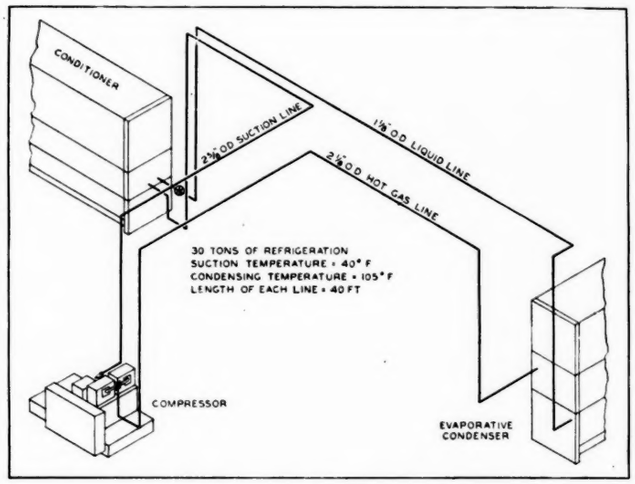
Continuing the 30 ton line vertically upward to its intersection with the 2⅝ in. O.D. line, we read the gas velocity at 2850 f.p.m. Projecting the 77 ft. line horizontally to its intersection with the 2⅝ O.D. line, we read the cost of materials at $34.

In like manner, we find, from curve 4 a 1⅛ in. O.D. liquid line with a liquid velocity of 270 f.p.m. and a cost of materials of $9. For the hot-gas line we select from curve 5 a 2⅛ in. O.D. size, read a 1650 f.p.m. velocity and a $23 cost.

In the case of the hot-gas line, it would appear from curve 5, that it might be possible to employ a 1⅝ in. O.D. line with a 3000 f.p.m. velocity and a cost of about $16. But 40 ft. of straight pipe plus 23 ft. for elbows, gives a total equivalent length of 63 ft. and the 1⅝ in. O.D. line is only good for 28 tons at the 2F friction loss as can be easily seen. However, if it should happen that only four elbows are to appear in the line, instead of six, then the total equivalent length of the line will be 40 ft. plus 4/6 x 23 ft. or 40 ft. plus 15 ft. or 55 ft. Under these circumstances, the 1⅝ in. O.D. line selection would be *on the nose* so to speak and the cost of materials would be $12 instead of $23. The velocity would be just under 3000 f.p.m.

Summing up, we find the following:

	Size, In. O.D.	Velocity, F.p.m.	Cost, Dollars
Suction line	2⅝	2850	34
Liquid line	1⅛	270	9
Hot-gas line	2⅛	1650	23
Total Cost Materials			66



Schematic diagram of air conditioning system used as a practical example to show how to size the refrigerant lines.

Thus far it has been tacitly assumed that only a single pair of pipe connections would be made at each of the units. Suppose, however, that while a single compressor is to be used, the condenser has two hot-gas and two liquid connections and the evaporator has three liquid and three suction connections. Then, according to Table IX, the hot-gas line would break down into two 1⅝ in. O.D. branches and the liquid line, into two ⅞ in. O.D. branches at the condenser. The liquid line would break down into three ⅞ in. O.D. branches and the suction line, into three 2⅛ in. O.D. branches at the evaporator. Moreover, it would be necessary to increase the total cost of materials, according to the table on page 49, by 6% plus 4% or 10%, giving a revised total materials cost of $73.

Now if, in the foregoing example, it had been desired to design the suction line to give only 1F friction drop from coils to compressor, this could have been accomplished by doubling the line length and number of elbows and selecting the line size on this basis. Thus, projecting vertically upward on the 30 ton line to the 80 ft. horizontal, and adding two times the elbow-allowance of 44 ft. for the 3⅛ in. O.D. line, gives a total equivalent length of 164 ft. and indicates 3⅛ in. O.D. as being the proper line selection. Obviously,

TABLE X.—COST OF LINES

Line Size In Inches O.D.	Net Cost Of Elbows* In Dollars Per Elbow	Net Cost Of Six Elbows In Dollars	Equivalent Length Of Six Elbows	Net Cost Of Tubing† In Dollars Per Foot	Equivalent Length Of Pipe And Elbows Totaling:— $10	$25	$50	$100	$200	$400	$800
⅜	0.067	0.41	4.72	0.049	201.7	509.7					
⅝	0.081	0.49	8.17	0.098	105.7	259.2	515.5				
⅞	0.135	0.81	11.77	0.139	78.1	186.7	367.0	727.8			
1⅛	0.248	1.49	15.37	0.188	60.8	141.0	274.2	540.4			
1⅜	0.378	2.27	18.97	0.251	49.8	109.5	209.0	408.0	806.0		
1⅝	0.518	3.11	22.57	0.304	45.2	93.9	176.1	340.6	669.6		
2⅛	0.742	4.45	29.77	0.465	41.7	73.7	127.4	235.6	450.6	880.6	
2⅝	1.375	8.25	36.97	0.660	39.6	62.4	100.3	176.0	327.5	630.5	
3⅛	2.070	12.42	44.17	0.870		58.6	87.4	144.9	259.9	489.9	949.9
3⅝	2.990	17.94	51.37	1.155		57.6	79.2	122.5	209.0	382.0	728.0
4⅛	3.920	23.52	58.57	1.447		59.6	76.9	111.5	180.5	318.9	595.7
5⅛	6.970	41.82	73.12	2.167			76.9	100.0	146.2	238.6	423.4

*Wrought Copper Elbows except 5⅛" O.D. size, which is cast brass. Prices as of 5-7-40 with usual discount applied.

†Government Type "L" copper tubing. Prices as of 5-7-40 with usual discount applied.

if a 3⅛ in. O.D. line, 80 ft. long and containing 12 elbows, will give a 2F drop, then the same size line will carry the same tonnage with a 1F drop through 40 ft. of straight pipe and six elbows. Since the velocity in the line would be 2000 ft. per minute, no objection attaches to the selection of the 3⅛ in. O.D. line, with the possible exception of cost, which would be about $49.

Conclusion

This paper was undertaken with the purpose of reciting the fundamentals of refrigerant line design and of developing, on the basis of those fundamentals, a set of curves which would give, in one quick reading, with reasonable accuracy, the line size, the refrigerant velocity, and the materials cost. It is ardently hoped that this purpose has been accomplished in such a manner as to be of interest and service to the many design engineers throughout the country who grapple daily with just such problems.

Finally, the curves developed herein have been copiously checked against six years of actual experience in refrigerant line sizing and pricing and have been found to be in close agreement with good field practice. Moreover, data taken from the ASHVE Guide 1939, the Trane Air-Conditioning Manual, and the Carrier Price and Data Book, when converted to the units of these curves and plotted thereon, were found, in general, to agree with these curves as well as they agree with each other.

Improved Instruments for Measuring Comfort Conditions

In England the great majority of homes are heated by fires or stoves. This type of system gives pronounced heat radiation in one direction and makes it very difficult to measure the factors which affect human warmth and comfort. Since temperature alone is not a complete criterion of comfort, the globe thermometer and eupatheoscope have been developed to take into account the effects of air movement, radiation and humidity. These instruments, however, are designed for use in rooms which have uniform methods of heating and they give entirely incorrect results in rooms heated by fires. Subjects in fire heated rooms complained of being too cool even when the eupatheoscope read over 65F. The same subjects, when in rooms heated by convection, felt comfortable at about 63F. In rooms heated by fires and with people sitting about 6 ft. from the fire, subjects complained that their backs were too cold when the eupatheoscope read 63F.

In a recent issue of the *Journal of the Institution of Heating and Ventilating Engineers* (London), K. W. Yarnold reports on some simple modifications of the eupatheoscope and globe thermometer which he made to correctly measure the comfort conditions in rooms heated by radiant fires.

A double type eupatheoscope was constructed of two complete hemicylindrical eupatheoscopes, with their flat faces apposed and insulated from one another by one-half inch gap filled with crumpled aluminum foil. Each half-cylinder has two thermometers, one with a coil around its bulb indicating the equivalent temperature, and the other with its bulb well shielded with aluminum foil, to check the setting of the thermostat.

It was found possible to dispense with a relay by using magneto points on the coiled bimetal strip of the thermostat as these points will stand the full main voltage and show no sign of wear after long periods of use. The thermometers were supported and protected by a wire mesh cage fixed on to the wooden framework. The instrument was calibrated against a globe thermometer in a small draft-free room, heated by convection, the double eupatheoscope and globe thermometer being enclosed, with advantage, in a tent of metal foil.

The globe thermometer was changed so that it is made up of two hemispheres of metal separated by a piece of wood. Two thermometers, one inserted in each hemisphere, are used for measuring the equivalent temperature. This second instrument is much cheaper and has been found to be almost as useful as a double eupatheoscope, although it does not take proper account of the air movement.

The advantages of a double eupatheoscope or globe thermometer over the regular type of instrument is shown in the following example:

If a room has wall and air temperatures both at 65F, the normal eupatheoscope will show a temperature of 65F. However, if this instrument is used to measure the temperature of a room heated by gas fire or electric radiant heater which has just been lit on a cold morning with the air temperature at 35F, the reading of the eupatheoscope may be 65F due to the large amount of radiant energy falling on its surface. Of course, in this latter case the room is not nearly as comfortable as in the first case. On the other hand, the double eupatheoscope or double thermometer will give clear indication of these conditions.

Some brief tests were conducted with these instruments and it was determined for conditions in England, the "back equivalent temperature" should be kept somewhere between 60 and 65F. When the temperature falls below 60F an increasing proportion of people will complain of cold backs, while if it rises above 65F, it usually means that the people feel too warm and the air temperature will have risen to a stuffy level. A typical comfortable reading was found to be 63F.

The "front equivalent temperature" necessary to give comfort was found to vary more widely and is usually over 70F, but in some cases it may be as low as 65F.

These brief tests showed that the back equivalent temperature in rooms heated with a radiant fire is of great importance in evaluating the comfort conditions of the room.

Number of Degree-Days for October, 1940

HEATING & VENTILATING continues its thirteenth year of publishing degree-day data for various large cities. Forty-four cities have been added to those previously published, making a total of 114 cities listed below.

	Degree-Days October, 1940	Cumulative
Albany, N. Y.	593	766
Alpena, Mich.	529	721
Atlanta, Ga.	62	103
Atlantic City, N. J.	350	412
Baker, Oreg.	461	661
Baltimore, Md.	296	345
Binghamton, N. Y.	558	735
Birmingham, Ala.	43	69
Bismarck, N. D.	435	562
Boise, Idaho	327	482
Boston, Mass.	450	561
Buffalo, N. Y.	502	639
Burlington, Vt.	635	850
Cairo, Ill.	85	131
Canton, N. Y.	670	872
Charles City, Iowa	318	452
Charlotte, N. C.	119	160
Chattanooga, Tenn.	146	216
Cheyenne, Wyo.	457	629
Chicago, Ill.	245	351
Cincinnati, Ohio	193	288
Cleveland, Ohio	348	467
Columbia, Mo.	118	188
Columbus, Ohio	265	371
Concord, N. H.	571	760
Concordia, Kan.	103	157
Davenport, Iowa	182	263
Dayton, Ohio	249	364
Denver, Colo.	284	355
Des Moines, Iowa	175	256
Detroit, Mich.	407	538
Dodge City, Kan.	104	159
Dubuque, Iowa	271	385
Duluth, Minn.	504	692
Eastport, Me.	647	943
Elkins, W. Va.	399	583
El Paso, Tex.	58	58
Erie, Pa.	422	547
Escanaba, Mich.	510	730
Evansville, Ind.	171	252
Fort Smith, Ark.	37	69
Fort Wayne, Ind.	300	423
Fort Worth, Tex.	19	26
Grand Rapids, Mich.	382	517
Green Bay, Wis.	417	575
Greensboro, N. C.	219	278
Harrisburg, Pa.	418	521
Hartford, Conn.	525	674
Helena, Mont.	478	637
Huron, S. D.	291	386
Indianapolis, Ind.	178	265
Ithaca, N. Y.	552	740
Kansas City, Mo.	86	144
Keokuk, Iowa	141	214
Knoxville, Tenn.	137	187
LaCrosse, Wis.	346	469
Lander, Wyo.	467	592
Lansing, Mich.	458	639
Lincoln, Neb.	111	176
Little Rock, Ark.	34	67
Los Angeles, Calif.	32	32
Louisville, Ky.	132	201
Lynchburg, Va.	236	303
Madison, Wis.	329	473
Marquette, Mich.	506	710
Memphis, Tenn.	45	76
Milwaukee, Wis.	307	441
Minneapolis, Minn.	347	463
Nantucket, Mass.	434	535
Nashville, Tenn.	90	141
New Haven, Conn.	443	549
New Orleans, La.	3	4
New York, N. Y.	371	435
Norfolk, Va.	182	208
Northfield, Vt.	694	985
North Platte, Neb.	244	304
Oklahoma City, Okla.	44	65
Omaha, Neb.	145	217
Oswego, N. Y.	514	691
Parkersburg, W. Va.	280	389
Peoria, Ill.	204	299
Philadelphia, Pa.	335	388
Pittsburgh, Pa.	331	430
Pocatello, Idaho	428	609
Portland, Me.	528	703
Portland, Oreg.	209	257
Providence, R. I.	454	560
Pueblo, Colo.	269	319
Raleigh, N. C.	166	216
Reading, Pa.	421	516
Reno, Nev.	317	477
Richmond, Va.	237	299
Rochester, N. Y.	118	254
Roseburg, Oreg.	205	266
St. Joseph, Mo.	89	154
St. Louis, Mo.	82	124
Salt Lake City, Utah	242	300
Sandusky, Ohio	330	440
San Francisco, Calif.	116	152
Sault Ste. Marie, Mich.	606	834
Scranton, Pa.	526	685
Seattle, Wash.	246	306
Sioux City, Iowa	185	267
Spokane, Wash.	376	457
Springfield, Ill.	128	195
Syracuse, N. Y.	555	732
Tacoma, Wash.	288	381
Terre Haute, Ind.	156	233
Toledo, Ohio	343	467
Trenton, N. J.	408	494
Utica, N. Y.	574	767
Washington, D. C.	300	361
Wichita, Kan.	77	119
Yakima, Wash.	307	345

ABSTRACTS of Current Papers, Books and Pamphlets

Copper Tubing

An extended investigation was made of the strength, under tensile loading, of sleeve joints in copper tubing, with wrought-copper and cast-brass couplings, soldered with (50-50) tin-lead and (95-5) tin-antimony alloys. In short time tests (speed of movable head 0.06 inch per minute) the strength of the joints was substantially equal to that of the tubing or fittings. The strength varied directly with the depth of insertion of the tubing into the fitting, and was greater at diametral clearances of 0.004 to 0.010 inch between tubing and fitting than at greater clearances. The strengths were higher at 0F than at 85F and decreased rapidly as the temperature was further increased.

In long-time tests (10,000 hours or more) under constant tensile loads, the strength of joints soldered with tin-lead was about one-eighteenth of that obtained in short-time tests, from 85F to 250F; joints soldered with tin-antimony had from one-fifth to one-seventh of the short-time strength, depending upon the temperature. At 250F and upward, diffusion of copper from the tubing into the solder films, in joints made with tin or tin-alloy solders, may weaken or destroy the metallic bond between the solder tubing.

Results of pulsating tensile-load tests, limited to the joints soldered with (50-50) tin-lead, indicated that the strength under repeated loading was not less than under steady loading.

[*"Strength of Soft-Soldered Joints in Copper Tubing," by Arthur R. Maupin and William H. Swanger, Building Materials and Structures, Report BMS 58, published by the National Bureau of Standards. Paper cover; 8½ x 11 in.; 25 pages. For sale by the Superintendent of Documents, Wash., D. C. Price, 10 cents.*]

•

Oxyacetylene Welding

A comprehensive course of classroom exercises and lectures covering oxyacetylene welding and cutting processes. The course consists of two separate books; one containing a complete set of work sheets, and the other lecture material to be used as a supplement to the first.

The book covering classroom exercises is intended to impress the fundamentals upon those who are interested in gaining a working knowledge of the art. Its 22 chapters describe the practice of both oxyacetylene welding and cutting.

The course of lectures, although printed in a separate book, works in close conjunction with the student exercises. It describes the history of the art, the properties of its materials, its theories and its practical applications in industry.

[*"Classroom Exercises and Lectures on Oxyacetylene Welding and Cutting Processes." Published by the Air Reduction Sales Co., 60 East 42nd Street, New York, N. Y. Classroom exercises, 50 cents per copy. Lecture book, $1.00 each.*]

BRIEF REVIEWS

Refrigerant Charts. A series of four Mollier heat charts on Freon refrigerants, covering Freon 11, 12, 21 and 113. Charts are approximately 19 x 24 in. in size and are printed in five colors on white. Use of different colors for ordinates, saturation, temperature, entropy, and volume lines permit rapid and accurate reading and give considerable relief from eyestrain as compared with black on white, which is usually used on charts of this type. Greater accuracy and rapidity of reading is also obtained by devoting approximately two-thirds of the charts to the superheat region as compared to one-third used on other charts for other refrigerants. [*"Mollier Heat Charts for Freon Refrigerants 11, 12, 21 and 113." Published by the Kinetic Chemicals, Inc., Wilmington, Del. Charts printed in five colors on white paper, sizes 19 x 24 inches. Available on request.*]

Boiler Treatment. This paper reviews the new trends in boiler water treatment for the prevention of scale, corrosion, embrittlement and carry-over. These include the latter developments in cold process softeners and the organolites or Zeo-Karb softeners. Consideration is given to the latest methods used for prevention of silica scale, as well as the so-called "Threshold treatments" for stopping scale in condensers and heat exchangers. The newer types of steam purifiers are described. There is also a discussion on corrosion in the "steam blanketed" areas of the boilers. Material has been reprinted from the transactions of the American Institute of Chemical Engineers. [*"New Trends in Boiler Feed Water Treatment," by Frederick G. Straub. Engineering Experiment Station reprint series No. 20. Published by the University of Illinois, Urbana, Ill. Paper cover; 8 pages; 6 x 9 in. Price, 15 cents.*]

Copper Tubes. A second edition of this publication on copper tubes and fittings for heating lines. Booklet includes information on suggested procedure for sizing copper tubing for hot water heating systems; gives plan outlines of installations, as well as data on copper tubes, heat losses, expansion and contraction and method of assembling solder type and flared tube fittings. [*"Anaconda Copper Tubes and Fittings for Heating Lines." Published by the American Brass Company, Waterbury, Conn. Paper cover; 8½ x 11 in.; 28 pages. Available on request.*]

Stokers. Presents test data on a design, effect and proper use of baffles for stoker fired boilers. Gives a considerable amount of practical information on the effect of baffles on stoker operation. [*"Baffles for Stoker Fired Boilers," bulletin L 38. Published by the Anthracite Industries Laboratory, Primos, Delaware County, Pa. Paper cover; 6 x 9 in.; 16 pages. Available on request; write to the Anthracite Industries.*]

NEWS OF THE MONTH

Bituminous Coal Group Inaugurates New Research Program; Aim is to Develop Close Control and Smokeless Operation

COLUMBUS — Bituminous Coal Research, Inc., the research agency of the bituminous coal industry sponsored by the National Coal Association, has inaugurated a $200,000 program of research aimed to advance the competitive position of coal by the development of better equipment for its use in home and industry. Following the plan adopted in the previous three and one-half year program of the corporation, Howard N. Eavenson, president, has completed arrangements with Clyde E. Williams, director, Battelle Memorial Institute, to carry on the program at Battelle.

The broad program of research, to be directed by Ralph A. Sherman, supervisor of Battelle's fuel division, will include studies of methods by which close control of heating and smokeless operation may be combined with the natural advantage of coal as a low-cost source of energy. The direct application of coal as a fuel for metallurgical and ceramic furnaces, methods for the complete gasification of coal for industrial and residential use, and the direct conversion to mechanical energy through the use of coal in a new type of internal-combustion engine are among the problems to be attacked as developed by the research program committee.

That the many thousands of low-cost homes of the country may have cooking and heating stoves that are smokeless and require the minimum of attention, the kitchen ranges and space heaters will occupy a prominent place in the program. In line with the previous program, residential stokers and coals for use on them will be the subject of investigation.

Further research on materials for the dustproofing of coals, with particular attention to those porous coals, now difficult to treat economically, is expected to broaden the distribution of coal that is clean to handle.

Financed jointly by the coal producers' associations, by individual producers, and by the coal-carrying railroads, the program is set up for a minimum period of three years.

A technical committee of fuel engineers representing the companies participating in the program will cooperate with the laboratory in the progress of the work. A smaller advisory group will meet with the research staff at frequent intervals to discuss the latest developments and to steer the program.

As results are obtained, they will be quickly made available to the supporters of the program through reports and bulletins. Bituminous Coal Research, Inc., also plans to be of service to the members by consultation on specific problems, by the dissemination of information in the current literature, and by coordination of research on coal in all parts of the country.

Tobey Foresees No Heatless Days

BIRMINGHAM, ALA.—There is no danger of "heatless days" in connection with national defense, such as occurred during World War days, said J. E. Tobey, of Cincinnati, vice-president of Appalachian Coals, Inc., in a paper on "National Defense and Coal Utilization" read before the coal division of the American Institute of Mining and the fuel division of the ASME, at the sixth annual convention here Nov. 7-9.

The paramount theme before the convention was national defense and Mr. Tobey said that the major problem in the handling of coal is transportation and that already railroads are working out plans for co-operation with the Army and Navy and key industries. He said that water transportation also had been improved.

Workers Subject to Dust Hazards

WASHINGTON—Surveys conducted by the U. S. Public Health Service of industrial plants reveal that the working environment of about one million persons requires investigation by trained industrial hygienists to determine whether or not the presence of silica dust in the air constitutes a health hazard. The conditions of work of 800,000 persons handling lead and its compounds also need study.

These surveys also indicate that many millions of workers are exposed to materials which, if improperly used, are capable of causing skin diseases.

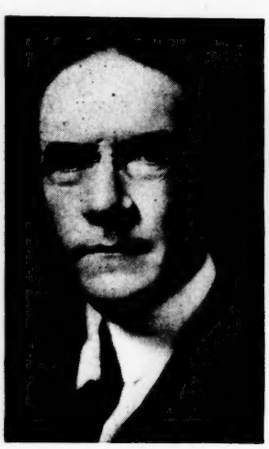
Burner Show Space 80% Sold

NEW YORK—That the National Oil Burner Progress Exhibition and Convention sponsored by Oil Burner Institute to be held at Commercial Museum, Philadelphia, March 17-22, 1941, will be the largest ever held is apparent from space figures released by C. F. Curtin, secretary of Oil Burner Institute.

As of November 23, over 80% of the exhibition space has been taken. The total number of booths sold to oil burner manufacturers, accessory manufacturers and oil companies is 130, far ahead of the 1937 Show.

American Air Filter Co. Not Sold

LOUISVILLE—The American Air Filter Company announces that trade and newspaper notices of its purchase by a large electrical manufacturing company were premature. Negotiations, which never advanced beyond the preliminary stage, have been definitely abandoned by mutual consent of both companies. There has been no change in ownership, management or field representation of the American Air Filter Company, which will continue to function as an entirely independent organization.



(Left) Howard N. Eavenson, President of the Bituminous Coal Research, Inc. (Center) Battelle Memorial Institute, Columbus, Ohio, where there will be carried out a $200,000 program of research aimed to advance the competitive position of coal by the development of better equipment for its use in home and industry. (Right) Ralph A. Sherman, Supervisor fuel division of the Battelle Memorial Institute.

SMA Hears Stoker Engineers' Report

CHICAGO—A decision to combine the best technical and merchandising talent in the membership of the Stoker Manufacturers' Association in a solidified effort to establish a sound and effective cooperative sales promotional and advertising campaign in the new home building field, was reached at the 1940 fall meeting of the Association, held at the Stevens Hotel here November 15. This, together with announcements of a concerted drive on the part of the Association's individual members to put into effect practical and effective winter sales plans for leveling out the stoker sales curve, constituted the major considerations and discussions.

Routine reports by chairmen of various standing committees were made. A meeting of the engineering and research committee was held during the day and reported to the members that an agreement had been reached by the committee in the establishment of tentative data on standard recommendations governing boiler base heights and grate dimensions. This will be submitted to the stoker industry for acceptance and then prepared for submission to the manufacturers of boilers as the official recommendation of the stoker manufacturers for base heights and grate dimensions for boilers built for stoker firing. It was also decided to undertake a survey of research work on stokers with a bibliography to be published by the Association when this survey is completed.

Engineer Licensing Considered

BOSTON—A number of engineers of Massachusetts have under consideration the question of a law providing for the registration of engineers in this state, and have even gone to the point of preparing a model law, which they would like to see passed by the state legislature if that body decides that engineers must be registered. The matter was discussed at a recent meeting of the ASHVE, when a committee appointed from the various component groups of the Engineering Societies of New England reported what had been done, and Arthur Weston, chief engineer of the Massachusetts State Department of Health read the provisions of the bill as prepared.

At the moment there seems to be no indication that such a bill will be passed, but the committee decided to provide a draft of a law that would be satisfactory to professional engineers and land surveyors in case the legislature should ever take up the matter. General opinion among engineers is said to be that such a law is unnecessary, and that if registration were made permissive instead of mandatory, there would perhaps be as many who did not register as of those who did. Advantages to those who do register under a permissive act are open to question, but some engineers seem to feel that it would give prestige to be known as a registered engineer, and make for confidence of those who have to employ an engineer.

Refrigeration Show Opens Jan. 13

CHICAGO—According to an announcement by M. W. Knight, general sales manager, Peerless of America, Inc., and chairman of the exhibition committee of the Third All-Industry Refrigeration and Air Conditioning Exhibition, at least 10,000 members of the trade should be registered during the four days of the show. As in the past it will again be held in the Stevens Hotel, Chicago. The show opens Monday morning, January 13.

Among, but not all of, the exhibitors who have so far taken space are: Acme Industries, Air Maze Corp., Alco Valve Co., Inc., Allen Bradley Co., All-Steel-Equip Co., Inc., Aluminum Company of America, Aluminum Industries, Inc., American Brass Co., American Injector Co., Anemostat Corp. of America, Ansul Chemical Co., Arcade Manufacturing Co., Automatic Products Co., Betz Corp., Bonney Forge & Tool Works, The Bush Manufacturing Co., Brunner Manufacturing Co., Carrier Corp., Chase Brass & Copper Co., Chicago-Wilcox Mfg. Co., B. H. Clark Co., Commercial Coil & Ref. Co., Copeland Refrigeration Corp., Curtis Refrigerating Machine, Cutler-Hammer, Inc., Davison Chemical Corp., Day & Night Manufacturing Co., The Dayton Rubber Mfg. Co., Deepfreeze Div., Motor Products, Deissler Machine Co., Detroit Lubricator Co., Dole Refrigerating Co., Dry Zero Corp., E. I. duPont de Nemours, Durabilt Steel Locker Co., The Electrimatic Corp., Fairbanks, Morse & Co., Fedders Manufacturing Co., Gale Products, The Gates Rubber Co., General Electric, General Refrigeration Div., Yates American Machine Co., L. H. Gilmer Co., W. A. Hammond Drierite Co., *Heating & Ventilating*, Howe Ice Machine Co., Henry Valve Co., Iceberg Refrigerated Locker, Imperial Brass Mfg. Co., Jarrow Products, Kason Hardware Corp., Kelvinator, Kerotest Mfg. Co., Kold-Hold Mfg. Co., The Linde Air Products Co., Marlo Coil Co., Jas. P. Marsh Corp., McCord Radiator & Mfg. Co., McIntire Connector Co., Mills Novelty Co., Minneapolis-Honeywell Regulator Co., Modern Equipment Corp., Mueller Brass Co., Northern Indiana Brass Co., The Pacific Lumber Co., Peerless of America, Inc., Penn Electric Switch Co., Ranco Inc., Refrigeration Appliances, Rotary Seal Co., Russell Electric Co., Servel, Inc., Spoehrer-Lange Co., Square D Co., Standard Refrigeration Co., The Super-Cold Corp., Superior Valve & Fittings, Swift Manufacturing Co., Tecumseh Products Co., Temprite Products Corp., The Texas Company, Tuthill Pump Co., Wagner Electric Co., Waukesha Motor Co., The Weatherhead Co., Westinghouse Elec. & Mfg. Co., White-Rodgers Elec. Co., Williams Oil-O-Matic, Wolverine Tube Co.

AIRTEMP'S 1941 LINE DISPLAYED

A five-day conference of Chrysler Airtemp's 42 district managers with company executives was held at Dayton the week of November 11 and the 1941 line of heating and cooling units displayed. Above, C. R. Neeson, chief cooling engineer, and I. C. Baker, vice president in charge of central station sales, point out to the convention some of the features of the Airtemp radial compressor installed on a 40-hp. air conditioning unit.

ASHVE Holds Meeting in Houston

HOUSTON—A two-day session was enjoyed by nearly 200 members of the ASHVE who gathered from 11 states for the fall meeting October 14-15 at the Rice Hotel here.

The first technical session was called to order by President F. E. Giesecke of College Station. A brief address of welcome was delivered by Robert J. Cummins, president of the Texas section of the A.S.C.E. Three papers were given at the opening session, the first by Prof. A. P. Kratz, Urbana, Ill., entitled Development of Instruments for the Study of Air Distribution in Rooms; the second by W. G. Darley, Cleveland, on the subject of Cooler Footcandles for Air Conditioning; and the third by F. R. Bichowsky, River Forest, Ill., on Chemical Dehumidification Agents.

The second technical session was held Tuesday morning, October 15, with the first paper by Prof. H. E. Degler, Austin, Texas, entitled Weather Conditions in Texas vs. Human Comfort. F. C. Houghten, Pittsburgh, Pa., director of the ASHVE research laboratory, gave an interesting discussion of the present and future research program of the Society. The concluding paper was presented by A. J. Rummel on Direct Evaporative Cooling for Homes in the Southwest.

Public Works Up in West Virginia

CHARLESTON, W. VA.—Announcing release of $2,493,755 in contingent appropriations, the West Virginia State Board of Public Works on November 25 increased to more than $5,000,000 its program of institutional building started or projected this year.

Proposed building includes a new armory and a health center at West Virginia University; a dining hall at Marshall College, and new science buildings at Glenville and Shepherd State Teachers' Colleges; $460,000 for a third and final unit at the medium security prison of Hottonsville; a $590,000 appropriation for a building program at Pinecrest Sanitarium, to include a central heating plant and many others.

Giesecke Addresses Pittsburghers

PITTSBURGH—The Pittsburgh chapter of the ASHVE met Nov. 18. F. C. McIntosh, president, presided.

A banquet was given in honor of the guest speaker, Dr. F. E. Giesecke, the national president. He spoke on Radiant Heating and Cooling. His discussion was illustrated with slides which took up the general practice of radiant heating in this country and in Europe.

Kramer Addresses ASRE Group

TRENTON—The Philadelphia section of the ASRE met here November 1 for the second meeting of the season. The afternoon was taken up by a visit to the Kramer Trenton Works and Baldwin Hill Rock Wool Plant. The dinner and business meeting were held at the Stacy-Trent Hotel at Trenton.

Papers read were "Low Velocity Electrical Anemometer" by Dr. Harry A. Rolnick, Director of the Trent Engineering Laboratories, Philadelphia; and "Development of the Fin Coil in Refrigeration" by Israel Kramer, vice-president of the Kramer-Trenton Company.

Engineering for Penna. Turnpike

In the article entitled "Ventilating Pennsylvania's Super-Highway" the design of the ventilating system for the tunnel was reported as being by Harold F. Hagen of the B. F. Sturtevant Company. This statement was an error. The tunnel ventilation was designed by Ralph Smillie, consulting engineer of New York, in collaboration with his associate, Charles W. Murdock, and the engineering staff of the Turnpike Commission. B. F. Sturtevant Company was the general contractor for the fans, motors and transmission used with the tunnel ventilation.

Location of public housing projects are shown in the above map. 76 projects are partially or completely occupied; 276 are under construction or completed, and 468 are under loan contract. The last includes 21 defense housing projects.

Properly Ventilated Air Raid Shelters Needed, Fleisher Declares in Talk Before Buffalo Heating Organizations

BUFFALO—The air conditioning industry should assume its place in the national defense program and impress upon governmental authorities the need for properly ventilated air raid shelters before bombs start falling on this country.

This warning was issued by Walter L. Fleisher in a talk before the Air Conditioning Council of Western New York, Buffalo Oil Burner Association, and Western New York chapter of the ASHVE.

"Our Industry now has a practical method of doing something in the war emergency which will yield an economical return," Mr. Fleisher declared. He urged the construction of air raid shelters in populous metropolitan centers above the ground, rather than below the ground as in England.

Declaring "we should take Europe as an example of what not to do," Mr. Fleisher described his findings in England where he spent considerable time making a study of air raid shelters. England, he said, was terribly slow to realize the peril of the situation and didn't begin construction of air raid shelters until she was on the very brink of war.

Even today, England's shelters are inadequate, he said. Most shelters are designed to provide six square feet of floor space per person. "When a person is required to confine himself in a space of this size for a period of 12 hours, he is almost willing to take his chances above ground," Mr. Fleisher said.

In making plans for ventilation of English shelters, it was found that carbon dioxide given off by occupants also had to be taken into consideration.

One of the most astounding things Mr. Fleisher discovered while in England was that in studying ventilation requirements for air raid shelters, English authorities had made no provision for heat given off by bodies of the occupants.

Pointing out that only now is Rome beginning to talk of the need for air raid shelters, Mr. Fleisher urged men in the air conditioning and ventilating field to take the initiative on the urgency of this matter and bring home to government officials the necessity for adequate preparation in this country before it is too late.

Clarence A. Gifford, president of the Western New York chapter, ASHVE, presided. Edwin R. Cooney, president of the Air Conditioning Council of Western New York, also spoke.

At the recent joint meeting of Buffalo organizations. Left to right, Walter L. Fleisher, first vice-president of the ASHVE; Clarence A. Gifford, president of the Western New York chapter, ASHVE, and Edwin R. Cooney, president of the Air Conditioning Council of Western New York.

Hagen Speaks to Boston ASHVE

CAMBRIDGE, MASS. — The Massachusetts chapter, ASHVE, held its monthly meeting at Massachusetts Institute of Technology Nov. 19. Guest speaker was H. F. Hagen, vice-president in charge of research, B. F. Sturtevant Company, who spoke on "Noises in Ventilating and Air Conditioning Systems."

The talk was followed by a question and answer and discussion period, led by Frank Merrill and J. F. Brinton.

Detroiters Hear Prof. Winslow

DETROIT — Forty-six members and guests were present at the first meeting of the season of the Michigan chapter of the ASHVE Oct. 9. President George Tuttle presided.

Prof. C.-E. A. Winslow was the speaker of the evening, his subject being "The Air Cooled Human Body."

Warm Air Program Completed

COLUMBUS—Final plans and the program for the 27th annual convention of the National Warm Air Heating and Air Conditioning Association, to be held at the Hotel Statler, Detroit, Dec. 10-11, have been completed. Features of the convention will include a talk by W. J. Cameron, nationally known radio speaker and public relations counselor for Ford Motor Company; R. K. Thulman, mechanical engineer, Federal Housing Administration, will speak on the consumers angle of the Yardstick for the Evaluation of a Forced Warm Air Heating System; the Warm Air Furnace Quintent, a stage playlet on How to Sell the 1941 Replacement Market; Professors A. P. Kratz and S. Konzo of the University of Illinois will present papers on technical research progress; Air Information—If You Please—the Committee of Six with L. R. Taylor, past president of the Association as chairman, will answer questions from the floor; Training Course Committee, John W. Norris, chairman, will present an outline of the new approach in a basically new Correspondence Course and Laboratory Course for Dealers and other members of the industry; Michigan State College Short Course Committee, Professor Lorin G. Miller, chairman, has a message on the benefits to be derived from the Tenth Annual Forced Warm Air Conference to be held at Michigan State College, East Lansing, Michigan, in March, 1941; Publicity and Merchandising Committee, Frank E. Mehrings, chairman, will give an outline of the new Consumer Booklet and Standard Contract Specification Form which his Committee is developing. Mr. Mehrings will also talk on the Merchandising and Publicity aspects of the Yardstick for the Evaluation of a Forced Warm Air Heating System; Research Advisory Committee, Fred G. Sedgwick, chairman, will report on the plans for the Technical Research Program for the coming year; Codes Committee, B. F. McLouth, chairman, will outline the changes which have been made in the new editions of the Standard, Practical and Technical Codes. He will also tell about the plans of his Committee for 1941.

Ferguson Offered FHA Post

WASHINGTON—The White House announced November 29 that President Roosevelt had accepted the resignation of Stewart McDonald as Federal Housing Administrator and that Mr. McDonald would become Deputy Federal Loan Administrator.

At the same time the President offered the Federal Housing post to Abner H. Ferguson, now first assistant FHA administrator.

Heating Gas Rate Cut Suggested

WASHINGTON—Public hearings probably will be held by the Public Utilities Commission in January before it acts on the proposal of a special consulting engineer for an order for full use of natural gas by the Washington Gas Light Co., beginning next spring, under which the engineer recommended a 40% cut in gas house-heating rates.

Company officials, who released a survey of their own on possible additional and complete use of natural gas, said they were interested in any development of value to their customers and then outlined many reasons why they thought the conversion to sole use of natural gas would be uneconomic, fraught with danger and otherwise undesirable.

Marcy L. Sperry, gas company president, said the reductions are based on the expectation "that natural gas can be bought at a 30-cent rate when 38 cents is the best that we have been able to negotiate from the only possible source of supply.

"Our studies show that in order to make a reasonable general rate reduction of even 20%, natural gas would have to be purchased at not more than 9.3 cents for the first year and at a rate graduating upward to 21.4 cents in the fifth year."

Members of the commission have been studying natural gas possibilities for nearly two years but yet have indicated no conclusion. About 10 months ago they employed Frank P. Fisher, natural gas engineer, to survey the possibilities, and he suggested the 40 per cent rate cut for space heating customers, under which he anticipated a first year saving to consumers of $745,000, anticipating that as rate cuts were extended later to other types of consumers the annual savings might reach as much as $1,530,000.

Differences of opinion exist between the company and the commission's consulting engineer on the costs of 100% conversion to natural gas, among which are those involving the estimated cost of change-over.

The company now uses between 30 and 40% of natural gas by volume in its manufactured product.

Carrier Addresses New Chapter

NEW HAVEN, CONN.—Closer cooperation among engineers to insure scientific and engineering progress in this country, was urged by Dr. Willis H. Carrier in an address at the inaugural banquet of the Connecticut chapter of the ASHVE.

A new classification of refrigerating engineers and heating and power plant engineers under the general heading of Thermal Engineers, was urged by Dr. Carrier.

Manufacturers' Volume Up in 1939

WASHINGTON — Eighteen companies engaged primarily in the manufacture of building equipment had a combined volume of business in 1939 of $299,000,000, compared with $280,000,000 in the preceding year, the Securities and Exchange Commission announced Nov. 18.

Of the eighteen enterprises, two of them, the American Radiator and Standard Sanitary Corporation and the Crane Company, accounted for 60% of the total assets and more than 55% of the volume of business for the group.

The other corporations were American Stove Company, Detroit-Michigan Stove Company, Florence Stove Company, General Bronze Corporation, Holland Furnace Company, Mumphreys Mfg. Company, Iron Fireman Manufacturing Company, Kalamazoo Stove and Furnace Company, Minneapolis-Honeywell Regulator Company, Herman Nelson Corporation, Otis Elevator Company, Ruud Manufacturing Company, Trane Company, United States Radiator Corporation, Williams Oil-O-Matic Heating Corporation and Yale & Towne Manufacturing Company.

A combined operating profit of $24,000,000, or 8.2% of sales, was reported by the eighteen concerns for the year, compared with an operating profit of $9,700,000, or 3.5% of sales, in 1938. These same concerns showed a combined profit after all charges, including non-operating gains and losses, prior claims, interest and income taxes, of $20,000,000, or 6.7% of sales, for the year, compared with $5,500,000, or 2.0% of sales, for the year 1938.

Woodward Iron to A.C. 3rd Furnace

BIRMINGHAM, ALA.—Air conditioning has proved its value to such an extent in blast furnace operation that the Woodward Iron Company, Birmingham, Ala., has just awarded a contract to the Carrier Corporation to condition its third furnace at an estimated cost of $75,000. This job will be completed in about three months.

This company was the first in the world to air condition a furnace about two years ago and since that time one other has also been conditioned, the object being chiefly to control the humidity of the air blast, so that the composition of the iron product can be more easily controlled.

According to H. A. Berg, president, air conditioning has increased pig iron output of the two air conditioned furnaces by 10 per cent during the seven or eight months of the year in which air conditioning is used. The equipment is not used during the Winter.

Air conditioning has also reduced coke requirements of the furnace by about 200 lb. per ton of iron ore.

NACA Schedules 1941 Convention

NEW YORK—The 1941 convention of the National Air Conditioning Association will be held at the Blackstone Hotel in Chicago January 13-15, according to an announcement made by President Jesse W. Page, Jr., at the close of a special meeting held November 2 at the association's headquarters at 220 East 42nd Street. Tentative plans for the convention were laid down and measures for immediate expansion of the association's membership and general program were discussed at the session.

Mr. Page also announced the retention, subject to the convention's approval, of Arthur F. Callahan, of New York, as executive secretary of NACA.

Also appointed was A. C. Buensod, of New York, as temporary treasurer to fill the unexpired term of John H. Keller, Detroit, resigned. Mr Callahan will act as assistant treasurer in conjunction with his duties as executive secretary.

Important agenda now being prepared for consideration at the convention include revision of the association's by-laws which has been undertaken, Mr. Page said, in the light of experience gained since the organization's first convention last January.

Members and prospective members who plan to attend the January convention were urged to communicate with the Blackstone Hotel, Chicago, as soon as possible in order to be assured of satisfactory reservations.

Officers of the National Air Conditioning Association are: president, Jesse W. Page, Jr., Page-Williamson, Inc., Charlotte, N. C.; vice-president, J. N. Sprekelmeyer, General Engineering Corporation, Fort Worth, Texas; treasurer, A. C. Buensod, Buensod-Stacey Air Conditioning, Inc., New York. These officers and the following members constitute the Board of Directors: John H. Keller, Mechanical Heat & Cold, Inc., Detroit; E. R. Cooney, Cooney Refrigeration Company, Inc., Buffalo; Alfred Epstein, Independent Refrigeration Company, Los Angeles; M. S. Lebair, York Ice Machinery Corp., Philadelphia, and S. J. Shure, Natkin and Company, St. Louis.

Seeley Presents ASME Papers

NEW YORK—Among the papers scheduled for presentation at the sixty-first annual meeting of ASME here Dec. 2-6 are the following: Wood-Burning Space Heaters, by L. E. Seeley and Frederic W. Keator; Calculation of Cyclone Pressure Drop, by Franklin Miller and Marcel Lissman, and Recent Developments of the Cyclonic Spray Gas Scrubber, by Robert V. Kleinschmidt and A. W. Anthony, Jr.

Reports 2000 Radiant Heat Jobs Installed throughout World

LOS ANGELES—An illustrated talk on "Radiant Heating and Cooling" was given at the November 13 meeting of the Los Angeles chapter, ASHVE, by F. W. Hutchinson of the University of California at Berkeley.

Mr. Hutchinson presented an informal discussion of international developments in the field of radiant heating and cooling, based on data he had gathered on a personal survey of installations during a trip through England and France prior to the outbreak of the European War. His talk, in the main, consisted of technical comment concerning installations illustrated by illuminated slides, together with conclusions he had drawn from discussions about radiant heating he had held with proponents of that type of system in European countries.

Mr. Hutchinson's talk dealt with three types of radiant heating and cooling: Rayrad and Dulray installations and panel embedded sinuous coil systems. Supplementary comment touched upon ceiling mountings and sidewall installations in notable structures in the British Isles and continental Europe.

Mr. Hutchinson presented a series of charts and graphs disclosing that at the close of 1938 there were in operation in the entire world 1225 panel heating systems using embedded hot water sinuous coils, which were distributed in 21 countries. Of this number 709 were in England, 252 in France and four in the United States. Installations of this type were being made, at that time, at the rate of 300 per year. In addition, he reported, there were in operation 150 installations of the direct electric type, 500 using cast iron pipe, which, with miscellaneous other types of systems, made a grand total of approximately 2000 radiant panel systems in use throughout the world.

The speaker's contemporaneous comment accompanied slide illustrations of invisible panel radiant heat installations, in connection with which he remarked that "a true panel radiant heating job must be installed in the ceiling"; barrel type installations; ceiling coil installations, which were illustrated with diagrams of the system in the British Embassy in Washington, D. C., largest system of that kind in use in the United States; Rayrad double and single convection systems; and dulray electric panel systems. The latter type were illustrated with slides showing such installations in use in the Provincial Newspaper Building, London, and in the Jewish Synagogue, Amsterdam.

Arendtz Predicts 1941 Business

BOSTON—Dr. Hermann F. Arendtz, staff economist of the United Business Service, was the guest speaker at the meeting of the Air Conditioning Bureau Nov. 21. This is the third successive year that the members have had the opportunity of hearing one of the country's best informed economists present his views on "What's Ahead for Business."

Dr. Arendtz predicted that the industrial index would reach 135 some time next year. The last half of the year will show some increased demand for consumer goods, but no great price rise or rise in living costs. Retailers will be pressed hard to maintain price levels, as there is less control over wholesale prices.

ASHVE to Meet in Phila. in 1942

PHILADELPHIA — The Philadelphia chapter of the ASHVE held its November meeting on the 14th at the Engineers Club. The meeting was addressed by Dr. F. E. Giesecke, national president, who spoke on "Radiant Heating and Cooling." The speaker at the December meeting will be T. A. Novotney, manager of the convector division, National Radiator Corporation. The subject will be "Cast Iron Radiation."

The chapter is now working on preliminary plans for the national convention of the Society, which will be held here in 1942. The Commercial Museum has been engaged for the exhibits, and a publicity committee has started work.

Building Code Urged for N.J.

NEWARK, N. J.—Establishment of a New Jersey state minimum building code is being sought through a campaign which has been launched by a joint committee composed of groups from the Building Inspectors' Association of New Jersey, New Jersey Engineering Society, New Jersey Society of Architects, and the State Board of Architects.

Charles Binder, Weehawken building inspector and chairman of the joint committee, announced that introduction of a bill to pave the way for such a code would be sought at the next session of the state legislature which will convene in Trenton in January. The proposed bill would provide for appointment of a commission to gather comprehensive data upon which the state code would be based.

"When one realizes that many towns in the state have no building code," Mr. Binder declared, "it can readily be seen that the state should step in as a matter of public safety.

N.J. Factory Building at New High

TRENTON—Approval of 149 plans for construction of factory plants during October establishes a high monthly numerical record for 20 years, Labor Commissioner Toohey announced Nov. 18. The number is 44% greater than the previous high, for March, 1920.

About 25% of the plans for new buildings and additions resulted from expansion required for national defense projects.

ONE OF SPENCER'S LARGEST

Two heating installations are in progress for Stroehmann Brothers Baking Company in its large Williamsport and Harrisburg, Pa., plants, installed by Herre Brothers, Harrisburg heating contractors. The Spencer steel boiler for stoker firing above is for the Williamsport job, and is one of the largest boilers manufactured by Spencer.

Plan Defense Housing in 11 Cities

WASHINGTON — Several important steps were taken Nov. 25 to remedy the lack of housing for workers on defense projects.

The first was by President Roosevelt, who authorized John M. Carmody, Federal Works Administrator, to proceed with defense housing in eleven cities where housing cannot be provided adequately by private enterprises and where the need is considered to be so acute as to impede the national defense program.

These cities are Philadelphia and Camden, N. J., which together need housing for 1000 families; New London, Conn., with needs for 300 families; Jacksonville, Fla., 300; Pensacola, Fla., 100; Charleston, S. C., 600; Indian Head, Md., 650; Boston, 1050; Vallejo, Calif., 950; Bremerton, Wash., 800; Island of Oahu, Hawaii, 1000.

Mr. Carmody reported the appointment of Clark Foreman, director of the power division of the Public Works Administration, to be special assistant to the Federal Works Administrator on Defense Housing. Mr. Foreman's present post will be taken temporarily by K. Sewell Wingfield.

Mr. Foreman has held the post he is vacating since 1935. He is a native of Atlanta and has served as special counsel to the Secretary of the Interior and as adviser to the Secretary of Interior on the economic status of Negroes.

Charles F. Palmer, Defense Housing Coordinator for the National Defense Advisory Commission, said that he has appointed Philip Norton of Los Angeles and Morton Bodfish of Chicago to dollar-a-year posts as consultants on housing for defense workers.

Mr. Norton will advise on the problem of housing defense workers through local private enterprise west of the Mississippi River and will help establish vacancy registrations in vital defense areas.

He is president of Philip Norton, Inc., of Los Angeles. As chairman of the Civic Committee for Defense Housing in Los Angeles he has worked on these problems with the Federal Government.

Mr. Bodfish will direct financing homes with private capital under the coordinated program.

Defense Plans Up Plant Building

WASHINGTON—The impetus of the National Defense Program is being felt in new plant construction. Contracts awarded for new manufacturing plants in the third quarter exceeded the same period in 1939 by more than 150%, and continued increases can be expected in this line. Gains were also substantial for other types of heavy construction.

Unit Heaters Subject of Meeting

TORONTO, ONT.—Unit heaters were the chief topic of discussion at the November meeting of the Ontario chapter, ASHVE. M. W. Shears, C. A. Dunham engineer, dealt with performance characteristics and various points to be considered in connection with unit heaters. Wm. Doerfling of Shelton's, Ltd., Galt, Ont., heating engineer and editor of the Sheldon's News, discussed application problems. Harry H. Angus, Toronto consulting engineer, gave an explanation of the rating of unit heaters and methods of control.

The discussion covered every phase of the subject and was highly informative, owing to the fact that each problem was handled by an expert in his line.

Emil Vilter

MILWAUKEE—Emil Vilter, since 1934 chairman of the board of The Vilter Manufacturing Company and a pioneer in the refrigerating machinery industry, died October 30.

Born in Milwaukee in 1871, Mr. Vilter was apprenticed in the shops of The Vilter Manufacturing Company, later becoming general superintendent of the company. He succeeded his brother, Theodore Vilter, as president in 1919. During a long and active life, Emil Vilter contributed substantially to the development and progress of the refrigeration industry. He was a past president of the Refrigerating Machinery Association and up to the time of his death a member of that Association's executive committee.

Mr. Vilter is survived by his wife, a son, and a brother.

Hollis French

BOSTON—Hollis French, widely known as a consulting engineer, particularly in the air conditioning, heating and ventilating fields, died Nov. 21, aged 72. He was a native of Boston and a graduate of the Massachusetts Institute of Technology. He directed much of the construction of new buildings at Yale University and supervised the building of many important power stations in New England.

Stewart A. Jellett, Jr.

PHILADELPHIA — Stewart A. Jellett, Jr., engineer and sportsman, died in Germantown Hospital recently after an illness of three weeks. He was 49.

Formerly president of the Stewart A. Jellett Engineering Company, founded by his father, he helped form about three years ago the Baisely & Jellett Company, manufacturers' agents, of which he was a member at his death.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACTS OF CONGRESS OF AUGUST 24, 1912, AND MARCH 3, 1933, OF HEATING & VENTILATING, published monthly at New York, N. Y., for October 1, 1940.

State of New York, County of New York, ss.:

Before me, a Notary Public in and for the State and County aforesaid, personally appeared Edgar A. Becker, who, having been duly sworn according to law, deposes and says that he is the Treasurer of The Industrial Press, publishers of HEATING & VENTILATING and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher, The Industrial Press, 140-148 Lafayette St., New York, N. Y.

Editor, Clifford Strock, 140-148 Lafayette St., New York, N. Y.

Managing Editor, none.

Business Managers, Robert B. Luchars, 140-148 Lafayette St., New York, N. Y.; Edgar A. Becker, 140-148 Lafayette St., New York, N. Y.; Erik Oberg, 140-148 Lafayette St., New York, N. Y.

2. That the owner is:

The Industrial Press, 140-148 Lafayette St., New York, N. Y.; Erik Oberg, 140-148 Lafayette St., New York, N. Y.; Robert B. Luchars, 140-148 Lafayette St., New York, N. Y.; Edgar A. Becker, 140-148 Lafayette St., New York, N. Y.; Laura A. Brownell, 140-148 Lafayette St., New York, N. Y.; Franklin D. Jones, 140-148 Lafayette St., New York, N. Y.; First National Bank and Trust Co. of Montclair and Robert B. Luchars, Trustees (Beneficiaries unknown), Upper Montclair, N. J.; First National Bank and Trust Co. of Montclair and Leigh Roy Urban, Trustees (Beneficiaries unknown), Upper Montclair, N. J.; First National Bank and Trust Co. of Montclair and Kenneth D. Ketchum, Trustees (Beneficiaries unknown), Upper Montclair, N. J.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are:

Laura A. Brownell, 140-148 Lafayette St., New York, N. Y.; John Connolly, 140-148 Lafayette St., New York, N. Y.; Franklin D. Jones, 140-148 Lafayette St., New York, N. Y.; Robert B. Luchars, 140-148 Lafayette St., New York, N. Y.; Louis Pelletier, 140-148 Lafayette St., New York, N. Y.; Elizabeth Y. Urban, 163 Western Drive, Longmeadow, Mass.; Helen L. Ketchum, King St., Cohasset, Mass.; Wilbert A. Mitchell, 28 Harlow Road, Springfield, Vt.; Henry V. Oberg, 1317 Hill Crest Road, R.D. No. 1, Lancaster, Pa.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

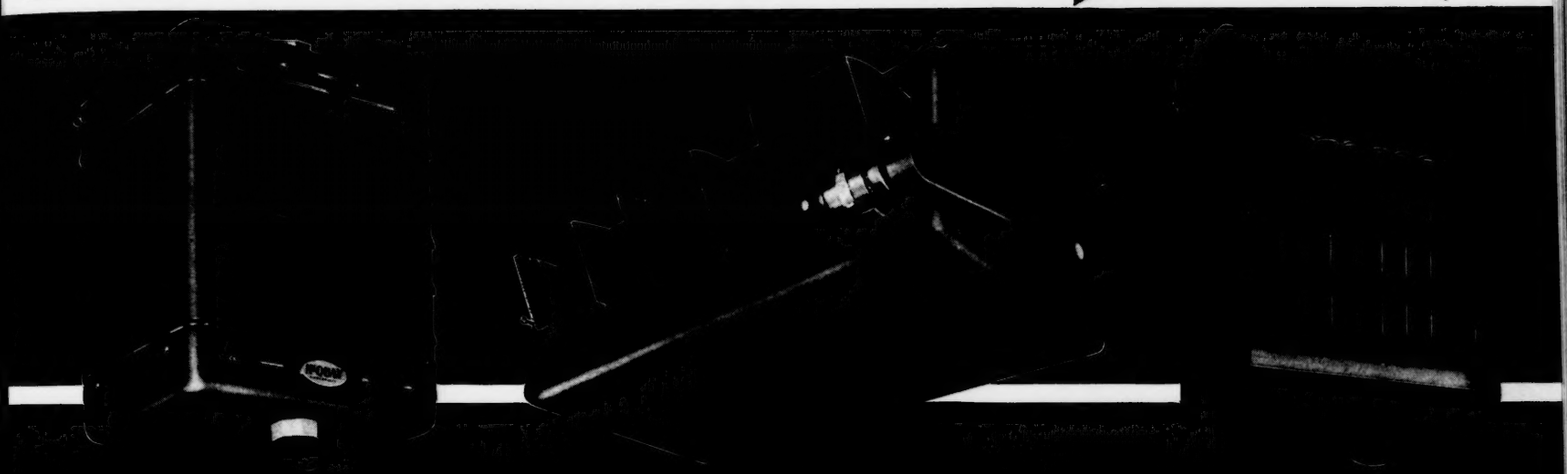
EDGAR A. BECKER, Treasurer.

Sworn to and subscribed before me this 26th day of September, 1940.

CHARLES P. ABEL.

Notary Public, Kings County No. 292; Kings Register's No. 1111; N. Y. County No. 217; N. Y. Register's No. 1-A-144. My commission expires March 30, 1941.

THE *New Light* IN AN ALL STAR LINE



STANDARD UNIT HEATER

BLOWER TYPE UNIT HEATER (*SUSPENDED*)

GAS FIRED UNIT HEATER

DOWN FLOW UNIT HEATER

BLOWER TYPE UNIT HEATER (*FLOOR*)

CABINET TYPE UNIT HEATER

THE McQuay Radial Type Unit Heater is the newest and the brightest light in this all star line. It is exclusive with McQuay. The McQuay line is complete and gives you a unit heater for every possible application. The new Radial Type Unit Heater provides wide, uniform heat distribution, lower installed cost and new economy of operation. One Radial Heater can be used in place of two or more standard units. You need look no farther than McQuay for your unit heater needs. McQuay, Inc., 1619 Broadway St., Minneapolis, Minn.

McQuay INC.

Air Conditioners . . . Air Conditioning Coils . . . Blast Coils . . . Blower Coolers . . . Comfort Coolers . . . Cabinet Radiation . . . Concealed Radiation . . . Evaporative Condensers

NEW EQUIPMENT

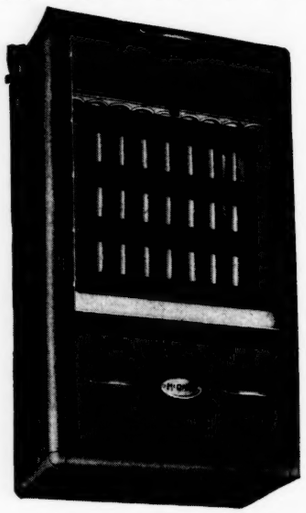
For providing a vertically downward discharge stream of heated air.

Herman Nelson hiJet Heater

NAME — Vertical Shaft propeller-fan type hiJet heater.
PURPOSE—To provide a vertically-downward discharge of heated air for applications where this type of discharge is desired.
FEATURES—Two distinct types are available, the model BMH for high-ceiling locations and the model AMH for lower ceiling locations. This first model is available in three different outlet arrangements; No. 1 will project a single column of air straight down; No. 2 projects two columns of air at angles of 30° to vertical and No. 3 arrangement projects the air at 30° to vertical in all directions. Adjustment is provided to vary the outlet velocity 25% from maximum. The second type, Model AMH, has two discharge arrangements. No. 1 provides a louver which directs one-half the heated air in one direction and one-half in the opposite direction; arrangement No. 2 has a specially designed outlet for the diffusion of heated air. The heating element provides many features such as expansion bends and a patented stay tube which assure longer life. In addition, three distinct heating elements will be available for each unit to provide a sufficiently low outlet temperature at higher pressures to permit satisfactory results. The fan, designed with wide face area and an aerodynamic or streamline shape, is said to operate efficiently and quietly.
SIZES & CAPACITIES—Model AMH is available in six sizes providing from 43,000 B.t.u. to 193,000 B.t.u. with air deliveries from 545 to 2620 c.f.m. Model BMH is manufactured in capacities ranging from 98,000 B.t.u. to 500,000 B.t.u. with air deliveries from 1330 to 7050 c.f.m.
MADE BY—*The Herman Nelson Corporation, Moline, Ill.*

McQuay Gas Unit Heater

NAME—McQuay gas-fired unit heater.
PURPOSE — Self-contained unit for supplying warm air using gas as a fuel.
FEATURES—Unit is designed to furnish automatically controlled warm air. Manufacturer states that the important features are low installation costs, quietness of operation, adjustable louver control system, thermostat control with sequence starting and complete safety control. In operation the room thermostat closes the fan motor and transformer circuits simultaneously. Transformer, in turn, energizes the solenoid valve and causes it to open. A thermostatic pilot and fusible wire safety limit control are provided to open the solenoid circuit, thus shutting off the gas supply if the pilot becomes extinguished, or if the safety wire fuses out. The solenoid gas valve can remain open only if the pilot is ignited and the fan operating.
LITERATURE AVAILABLE—Bulletin No. 765.
CAPACITIES—Seven sizes from 65,000 to 255,000 B.t.u. per hour.
MADE BY—*McQuay Inc., 1619 Broadway St., N.E., Minneapolis, Minn.*



McQuay gas fired unit heater.

Grant Wilson Duct Connection

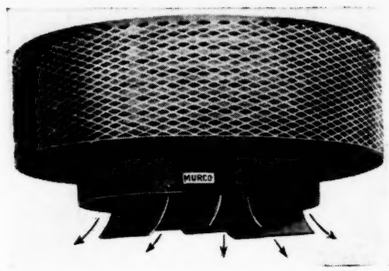
NAME—Flexible duct connection.
PURPOSE — For joining equipment such as blowers, heaters, and washers to ducts to stop vibration and noise from being transmitted through the duct system.
FEATURES — This duct connection material is available in bands 6 in. wide put up in a roll 50 ft. long. Both edges are selvaged to prevent fraying or ravelling and to make a tight permanent joint. The material is made up of woven flexible asbestos.
MADE BY — *Grant Wilson Inc., 4101 W. Taylor St., Chicago, Ill.*

M-H Zone Control System

NAME — Averaging Thermostat zone control system.
PURPOSE — A modulating system for controlling two pipe steam heating plants where a constant source of steam is available.
FEATURES—Manufacturer states that this system is suitable for single or multiple zone application and that it employs two or more graduate-acting thermostats which are placed at representative locations in the zone and which position a modulating zone valve in accordance with their demand. Because the point of control is inside the heated space this system is said to be particularly well suited to jobs where changes in occupancy or internal heat load are a major factor, and where a single representative control location cannot be established. As the flow of steam is continuous, expansion noises in the piping and cold radiators are eliminated. Because the amount of steam supplied to the system is varied it is necessary that all radiators be properly orificed and that a relatively constant pressure differential be maintained between the supply side of the motorized valve and the system return.
MADE BY — *Minneapolis-Honeywell Regulator Co., 2950 4th Avenue South, Minneapolis, Minn.*

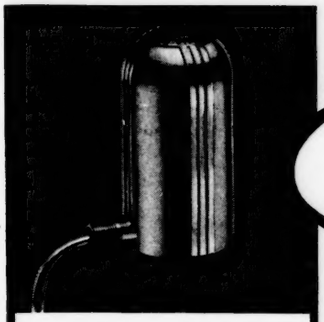
Murray Projection Unit Heaters

NAME—M Series Murco.
PURPOSE—A vertical projection unit heater for supplying warmed air.
FEATURES — These unit heaters are made with the heating element of all copper and bronze, with few brazed joints. Copper fins are metallically bonded to the copper tubes which is said to give a permanent bond. Manufacturer recommends these heaters for such applications as blanking of cold drafts in front of doorways in markets, industrial, office and similar buildings with high ceilings, or in any building that has a wide area to be heated. They are made in 11 models.
MADE BY — *D. J. Murray Mfg. Co., Wausau, Wis.*

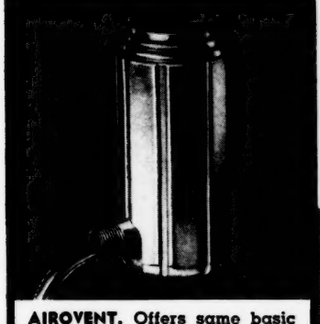


Murco projection unit heater.

One of these MARSH AIR VALVES will handle the job better—



AIRLINER. Best of the better valves. Big capacity, silent Marsh multi-port venting. New, separate, delayed drainage float chamber and baffle prevent spitting or spurting under any condition. Four styles: adjustable or non-adjustable; with or without vacuum check.



AIROVENT. Offers same basic features of the Airliner at popular price. Two styles: with or without vacuum check. Both styles adjustable.

IF you want to be sure that you have the best, the most modern air valve for every service and price requirement, stick to the Marsh line!

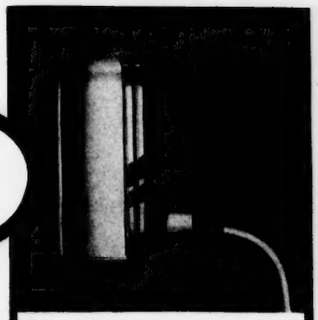
In every valve bearing the Marsh name—from the superlative No. 2 Airliners down to the attractively priced Travall—you will find quality, precision, advanced design and beauty that can only be described as . . . Marsh.

WRITE FOR THE CONDENSED CATALOG

It's your handy guide and quick-reference price sheet on today's finest air valves.

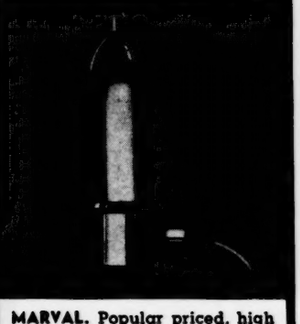
JAS. P. MARSH CORPORATION

2089 Southport Ave., Chicago, Ill.



No. 73. A really good valve, competitively priced. Large capacity, Marsh multi-port silent venting and many other advanced features. Venting rate is adjustable.

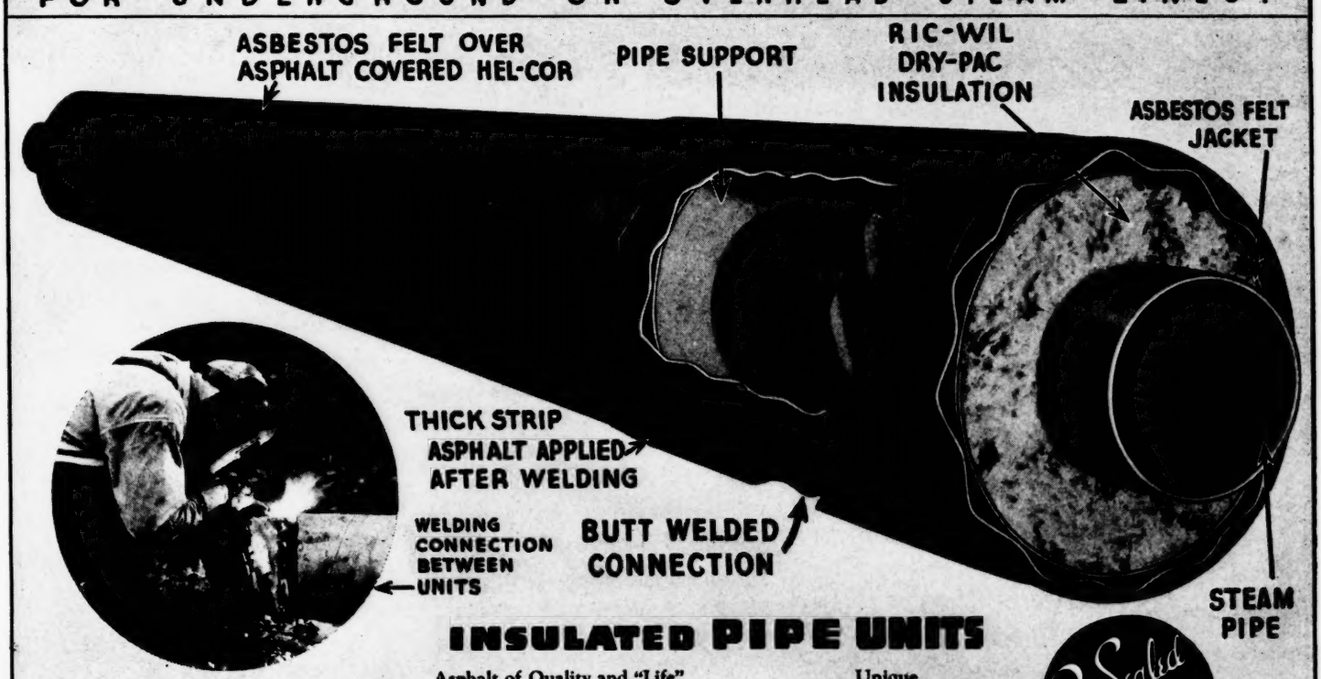
TRAVALL. A remarkable combination of high quality at lowest price. Similar to No. 73 but not adjustable.



MARVAL. Popular priced, high grade, chrome plated valve. Large capacity, quiet operation. Available with or without vacuum check.

The oldest manufacturer — the newest ideas

FOR UNDERGROUND OR OVERHEAD STEAM LINES!



INSULATED PIPE UNITS

Asphalt of Quality and "Life" Protects a Strong, Pure Iron Shell of Precision Pre-Fabrication by Armco

Unique Strong • Dependable! Made Possible only by Modern Engineering

Pre-Sealed by Ric-Wil

BUTT WELD LAP WELD

FLANGE WELD

THE RIC-WIL CO.

Agents in Principal Cities

Cleveland, O.

Write for Bulletin #4013

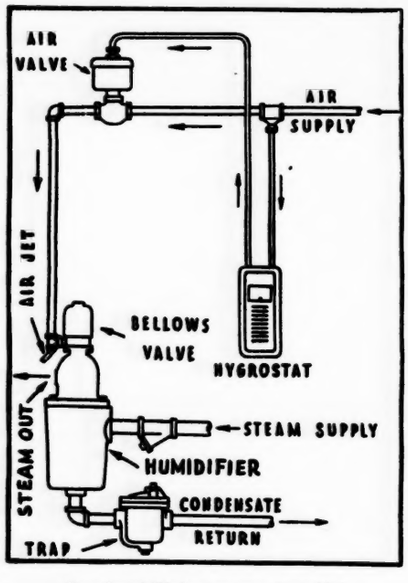
McQuay down-flow unit heater.

McQuay Down-Flow Unit Heater

NAME—McQuay Down-Flow unit heater.
PURPOSE—For supplying heated air downward to the working levels.
FEATURES—It is said that these units are particularly adaptable to high ceilings where they reclaim wasteful stratified heat and force the warm air down to the working zone over a wide area. The heating element is designed to operate on steam or forced hot water. All units can be supplied with variable speed motors which is said to offer a simple and inexpensive method of controlling the heat output.
LITERATURE AVAILABLE—Bulletin No. 745.
MADE BY—*McQuay Inc., 1619 Broadway St., N.E., Minneapolis, Minn.*

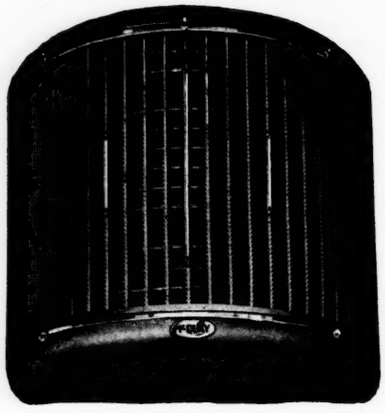
Armstrong Humidifier

NAME — Air operated steam type humidifier.
PURPOSE—For installation in locations where electric circuits are undesirable.
FEATURES—Because this humidifier uses no electricity in its operation it is believed that the unit will have considerable field of use in chemical and processing plants, munitions plants, milling plants and hospitals where explosive hazards exist. The assembly includes a pneumatic hygrostat which acts as a pilot valve to admit pressure to the diaphragm chamber of the main air valve when the relative humidity drops below the desired percentage. Opening of the main air valve allows compressed air to flow to the humidifier when the pressure builds up and opens a steam valve in the top of the humidifier. The steam valve admits steam to a special silencing chamber in the humidifier from whence it escapes directly to the atmosphere to add humidity to the room. Circulation and distribution of the steam is facilitated by allowing a small amount of compressed air to go to a blow nozzle directly above the steam outlet. Compressed air for the humidifier may be at any pressure from 20 to 100 lb. or less. Unit is said to have a maximum capacity for adding moisture to air at the rate of 44 lb. per hour.
MADE BY—*Armstrong Machine Works, 846 Maple St., Three Rivers, Mich.*



For humidifying rooms in which explosive vapors might be present.

McQuay Radial Unit Heater



McQuay radial unit heater.

NAME—McQuay Radial unit heater.
PURPOSE—For supplying heated air.
FEATURES—Manufacturer states that one radial unit heater can be used in place of two or more of the standard single direction heaters. The unit is made in one style for suspension only and is encased in a semi-circular steel casing finished in brown baked-on wrinkled enamel.
SIZES—Seven cabinet sizes in 22 capacities from 41,690 to 476,000 B.t.u. per hr.
LITERATURE AVAILABLE—Bulletin No. 750.
MADE BY—*McQuay Inc., 1618 Broadway, N.E., Minneapolis, Minn.*

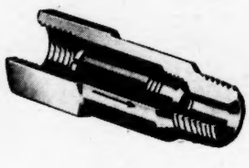
Remote bulb Econostat.

Barber-Colman Econostat

NAME—Remote bulb Econostat.
PURPOSE—For regulating heating systems in apartments, offices, hotels, factories and similar buildings.
FEATURES—This control is designed for those installations which cannot be satisfactorily controlled from a single thermostat. It regulates the heating directly from the outdoor temperature by supplying the heat at intervals. In operation it is said to maintain the indoor temperature by varying the "heat-on" periods in accordance with outdoor temperature changes. Thus, it is said the heat supplied to the building is in proportion to the heat loss and is not dependent on the temperature in any particular room. It is said that this control can be installed in either new or existing buildings and will control any type of heating system whether it be oil-, gas- or stoker-fired, or central steam system.
MADE BY — *Barber-Colman Company, Rockford, Ill.*

Spraying Systems Strainer

NAME—Spraying Systems strainer.
PURPOSE—To prevent foreign matter from reaching spray nozzles.
FEATURES — Strainer is equipped with ¼ in. pipe connection for inlet and outlet and standard stock construction is brass with Monel metal strainer. Other materials and sizes can be specified.
MADE BY — *Spraying Systems Co., 4033 W. Lake St., Chicago, Ill.*

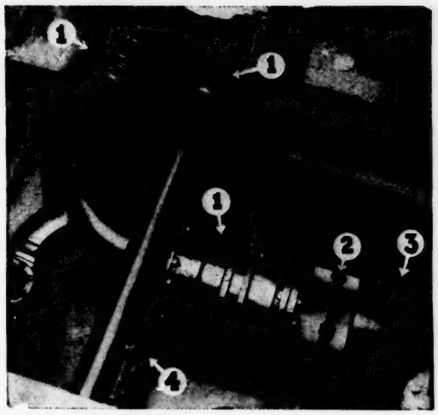


Spraying Systems strainer.

ADSCO INTERNALLY GUIDED JOINT

A COMPACT, EASILY INSTALLED JOINT FOR HIGH OR LOW PRESSURES

A Typical Manhole Installation



(1) ADSCO Internally Guided Joints in manhole under construction (2) ADSCO Insulation Support (3) ADSCO Pipe Alignment Guide and (4) ADSCO Empire Steam Trap.

Can be specified with Confidence for years of Efficient Operation —Hundreds in Daily Use.

An internal guide on the inner end of the slip provides true axial movement throughout entire slip traverse. No metal to metal contact between polished slip surface and body. Slip cannot pull out of the joint. A compact joint for restricted space—largest diameter is the flange.

Available in single or double joints in semi-steel or steel bodies for high pressures and high temperatures with flanged or beveled ends.

Write for Bulletin No. 35-30V

Sectional View of Joint

A Few Users

Cons. Gas, Elec. Lt. & Pr. Co. Baltimore, Md.
Philadelphia Electric Co. Philadelphia, Pa.
Atlanta University Atlanta, Ga.
Moose Lake State Hospital Moose Lake, Minn.
Olds Motor Works Lansing, Mich.
Union Pacific R. R. Co. Council Bluffs, Ia.
U. S. Navy Yard Brooklyn, N. Y.
Wards Island Sewage Works Wards Island, N. Y.

AMERICAN DISTRICT STEAM COMPANY

NORTH TONAWANDA, N.Y.

IN BUSINESS OVER SIXTY YEARS

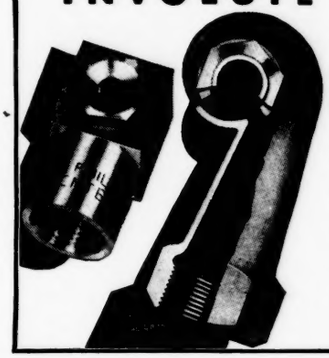
Instantaneous Direct Reading All Purpose

AIR VELOCITY METER

The Alnor Velometer is a sensitive, accurate, durably built and easily used portable instrument. Indispensable to engineer and technician for measuring air velocities for all types of grilles, ceiling outlets and ducts. Write for bulletin giving detailed information.

ILLINOIS TESTING LABORATORIES, INC.
143 W. Hubbard St. CHICAGO, ILL.
Manufacturers of electric thermometers and pyrometers

YARWAY INVOLUTE NOZZLES



The preference for trouble-free air washing service — because there are no internal parts or vanes to wear or clog. Proven through many years of service in water cooling and air conditioning installations totaling more than 5 million g. p. m.

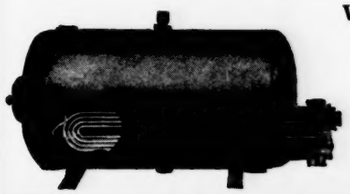
Made in sizes and types for all requirements. Ask for Bulletin N-615.

YARNALL-WARING CO., PHILA.
104 MERMAID AVENUE

Let rust-free hot water contribute to your success

There is no better way to win and hold clients... no surer way to get clients to recommend you ... than by specifying products which give satisfaction.

You can be absolutely certain that Patterson Everdur or Copper-Lined Hot Water Heaters will give entire satisfaction because they are guaranteed not to rust or cause red water—guaranteed to furnish all the hot water required, as hot as required and as quickly as required.



Write now for full particulars and catalog.

The Patterson-Kelley Co., Inc.
105 Burson St.
East Stroudsburg, Pa.

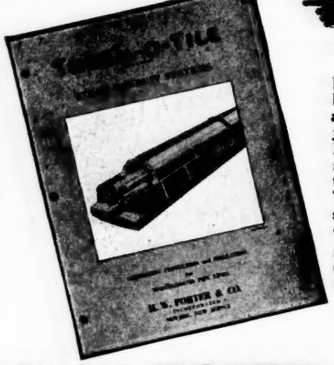
Patterson Hot Water Heaters

The Conduit for
Underground Pipe Lines

THERM-O-TILE

Reg. U. S. Pat. Off.

SIMPLEST • STRONGEST • MOST EFFICIENT



This Bulletin tells all about it

Monolithic concrete base. No broken stone fill. Strong arched construction. No bell joints. Internal channel drain, Etc. There are ten other reasons why Therm-O-Tile is the superior conduit system. Treated fully in Bulletin 381, shown at the left.

Therm-O-Tile is sold and installed by Johns-Manville Construction Units in all Principal Cities.

See our page in Sweet's or The Heating Guide.

H. W. PORTER & CO., Inc.

823-V Frelinghuysen Ave., Newark, N. J.

Without obligating us in any way, ☐ Please send Bulletin 381. ☐ Send representative. ☐ Enclosed is a sketch, with principal data of a prospective job on which we shall be glad to have your comments or quotations.

Name.....

Firm.....

Street.....

City..... State.....

NEW TRADE LITERATURE

Blower Wheels. A standard size bulletin giving complete details with guaranteed performance charts and ratings on the full line of Airotor blower wheels. Two additions to the Torrington line are described in this bulletin—the 9 in. single width, single inlet wheel and the 10½ in. double inlet spider and plate wheel. The Torrington Manufacturing Company, Inc., Torrington, Conn.

Convectors. Two standard size sheets illustrating and describing the Commodore Heaters Convectofins. The first sheet shows method of operation of Simplex single steam Convectofin, the Waterflow hot water heating Convectofin, and the standard two-pipe system Convectofin. The second sheet illustrates these units. Commodore Heaters Corporation, 11 West 42nd St., New York, N. Y.

Fire Brick. A standard size 8-page bulletin presenting technical data on the A. P. Green insulating fire brick. Includes information on how to select fire brick and data on the properties of Green fire brick in the form of graphs and tables. A. P. Green Fire Brick Co., Mexico, Missouri.

Heat Transfer Surface. A 24-page engineering bulletin No. 440 entitled, "More Heat Transfer Per Foot." This manual describes in detail how Thermek, an integrally splined extended surface tubing, can be used to reduce the size, weight and cost of heat transfer equipment. Tabulations of overall heat transfer coefficients are included for a wide variety of transfer equipment. Physical data covering all sizes of tubing in six different metals are listed. Thermek Corporation, 105 West Adams Street, Chicago, Ill.

Instruments. A standard size 20-page catalog No. 6706 on Brown rectangular case thermometers and pressure gauges. Catalog covers the complete line of vapor-actuated, gas-actuated, mercury-actuated and portable thermometers for indicating, recording and controlling processing operations. The Brown Instrument Company, Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.

Refractories. A 48-page export booklet entitled, "World-Wide Refractories Service." Book is printed in both English and Spanish and has sixty-five illustrations in addition to thirty technical drawings of brick sizes and shapes. General Refractories Company, Philadelphia, Pa.

Refrigeration Compressors. A 6-page standard size bulletin C-1100-B11, on the Worthington-Carbondale two-cylinder type refrigeration compressors. Gives information on the design, construction, and dimensions of sizes 5 in. x 5 in., and smaller. Carbondale Division, Worthington Pump and Machinery Corporation, Harrison, N. J.

Solenoid Valve. A standard size 8-page circular No. 100 entitled, "ASCO Solenoid Valves for Automatic and Remote Control of Air . . . Steam . . . Liquids . . . Gases." This catalog gives general information on the various valves in the Automatic Switch line. Automatic Switch Co., 41 East 11th St., New York, N. Y.

Vacuum Return Units. A standard size 8-page bulletin No. 100 illustrating and describing the Ames vacuum return units. Gives information on dimensions, specifications, and capacities. Ames Hydrovac Corp., 290 Scholes St., Brooklyn, N. Y.

WITH THE MANUFACTURERS

Tom Brown

Avery Engineering Company, 1906 Euclid Ave., Cleveland, has appointed *Tom Brown* as manager in charge of Koolshade sales. Mr. Brown will handle both the wholesale and retail developments of the Koolshade sales in the State of Ohio for which Avery Engineering Company is the sole distributor for Koolshade. Mr. Brown was formerly vice president and general manager of Autovent Fan & Blower Company, Chicago.

Combustion Engineering Company, Inc., New York, has appointed *Edgar R. Troxell, Jr.,* Bronxville, N. Y., as sales representative in the State of Connecticut.

Elgo Shutter & Manufacturing Co., Detroit, has moved its general offices and factory from 634 West Warren Ave. to 6970 West Jefferson Ave.

Enterprise Foundry Company, San Francisco, at a recent meeting of its Board of Directors, appointed *Captain C. S. McDowell,* U. S. Navy, Retired, as their new president and general manager. *Charles Hoehn,* for many years president of this 54-year-old firm, was elevated to the board chairmanship. Captain McDowell was formerly shipbuilding consultant at the Consolidated Steel Company, Los Angeles, and previous to that time has held such positions as manager of the Pearl Harbor Navy Yard, Engineer Officer at Mare Island, and Supervising Engineer of Design of the 200-inch Telescope and Director of Construction of the Palomar Mountain Observatory. Further personnel additions are contemplated in the near future. The company has also appointed *C. M. Sayre* as production manager and *Hal W. Forsey* as controller. Mr. Sayre was formerly with Westinghouse Electric and Manufacturing Co. Mr. Forsey was formerly with Rosenberg Bros. & Co., Oakland.

Marlo Coil Company, St. Louis, has appointed *William J. Badgley* to represent the company in Arkansas, Tennessee and Southern Missouri.

Perfex Corp., Milwaukee, Wis., announces the removal of its New York office from 90 West Street to 370 Lexington Avenue. *George D. Kingsland,* who recently became associated with the Perfex Corporation as vice president in charge of its Eastern sales division, will make the New York office his headquarters.

The Pittsburgh Water Heater Corp., Pittsburgh, Pa., has appointed *Thomas Gray* as its sales representative in Colorado, Utah and Southern Wyoming. He will maintain headquarters at Fort Collins, Colorado.

Research Products Corporation, Madison, Wisc., has appointed *Sullivan Valve and Engineering Company,* Butte, Montana, as its representative in that State for Research Air Filters.

Spraying Systems Co., 4033 W. Lake Street, Chicago, has appointed *F. R. Magill,* 1807 First National Bank Bldg., Pittsburgh, as representative in western Pennsylvania, and in neighboring districts of Ohio and West Virginia. Also recently appointed is the Manufacturers' Supply Co., 1201 C Street, N.E., Washington, D. C.

Standard Stoker Corp., New Albany, Ind., has purchased the manufacturing equipment, rights and pat-

dependable A-P valves control refrigeration

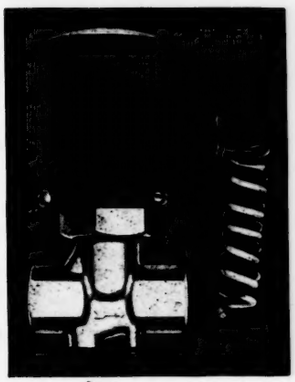
18 A-P VALVES SERVE CLARK'S YORKTOWN DINING ROOM

Famous Cleveland *Tourist-Stop*

Clark's Yorktown Dining Room — W. 117th St. & Clifton Blvd., Cleveland, O.

Clark's Yorktown Dining Room is one of 20 famous Clark Restaurants known in Cleveland and vicinity for their delicious food and charming surroundings. Many of them use A-P Valves. *In the Yorktown Dining Room alone, 18* A-P *Expansion Valves and Solenoids dependably protect food delicacies and beverages.*

Refrigeration Engineers responsible for Refrigeration efficiency in modern Restaurants like Clark's — naturally turn to A-P for sure Valve DEPENDABILITY. They know that steady, accurate Refrigerant Control is the backbone of success on any installation. And A-P Valves have never let them down.



Protect* YOUR *installations with* A-P *Valves! Then you can forget "Valve Trouble" for Good!

Attend the Third All-Industry Refrigeration and Air Conditioning Exhibition, January 13-16, Stevens Hotel — A-P Booth No. 128-129.

New A-P Model No. 73RJ Refrigerant Solenoid Valve . .

For Small Units. Maximum Operating Differential 125 to 180 lbs. per square inch. Exclusive A-P quieting feature prevents hum and excessive operating noises. Has handy mounting bracket. Easily cleaned on line.

★ *Progressive Service Engineers Use and Recommend — and Aggressive Jobbers Stock and Talk — A-P Products.*

AUTOMATIC PRODUCTS COMPANY
2462 NORTH THIRTY-SECOND STREET
MILWAUKEE WISCONSIN
Export Department, 100 Varick Street, New York City

★MORE EFFICIENT AIR CONDITIONING WITH

MARLO

COIL UNITS

for direct expansion air cooling, supplied complete with distributor and valve. Made of suitable material for ANY refrigerant. Absolutely pressure-tight.

Our Bulletin 406 describes our short method of selecting a coil. Send for it, free of charge.

We invite you to see our interesting exhibit, booth 154-5, at the All-Industry Refrigeration Show, Chicago.

MARLO COIL COMPANY

6135 Manchester Avenue St. Louis, Missouri

Manufacturers of heat-transfer surface for any application.

ents of the Cool Flue natural draft stoker from Cornell Mfg. Corp., Indianapolis, Ind. Equipment has been moved to Standard's new factory in New Albany.

The Torrington Manufacturing Co., Torrington, Conn., has appointed *Norman H. Wright*, 25 Irvington St., Boston, as exclusive sales representative in New England. Mr. Wright succeeds the late P. M. Patterson with whom he had been associated for some time after a period of specialized training in the Torrington laboratory and shop.

United States Air Conditioning Corporation, Minneapolis, effective November first, will handle its export business through its Export Division, 810 Graybar Building, New York City, according to President A. A. Feinberg.

Worthington Pump and Machinery Corp., Harrison, N. J., has appointed *Earl G. Morgan*, who has been active in air conditioning and refrigeration since 1914, to its air conditioning and refrigeration division. His headquarters are at the corporation's Kansas City, Mo., office. Mr. Morgan served as sales manager of the refrigeration department of the United Iron Works Company, Springfield, Mo.; was connected with Frick Company at Dallas, and for nine years was district representative of Vilter Mfg. Co. at Kansas City.

Young Radiator Company, Racine, Wisc., has appointed *J. A. Sullivan*, 112 Groveland Ave., Buffalo, to handle the sale of products of the catalog products division of the company in the Buffalo territory.

COMING EVENTS

JANUARY 13-15, 1941. Convention of the National Air Conditioning Association at the Blackstone Hotel. Details obtainable from A. F. Callahan, executive secretary of the association. NACA Headquarters, 220 E. 42nd St., New York.

JANUARY 13-16, 1941. Third Refrigeration and Air Conditioning Exposition to be held at Stevens Hotel, Chicago.

JANUARY 27-29, 1941. 47th Annual Meeting of the American Society of Heating and Ventilating Engineers to be held at Hotel Muehlbach, Kansas City, Missouri, with Kansas City as Host Chapter.

MARCH 17-22, 1941. National Oil Burner Progress Exhibition of oil heating and air conditioning equipment. Commercial Museum, Philadelphia. Further information available through C. F. Curtin, Oil Burner Institute, 30 Rockefeller Plaza, New York.

JUNE 10-13, 1941. The 32nd Annual Meeting of the National District Heating Association. To be held at the William Penn Hotel, Pittsburgh, Pa.

JUNE 16-20, 1941. The Pacific Heating and Air Conditioning Exposition, Exposition Auditorium, San Francisco, Cal. Managed by the International Exposition Company, Grand Central Palace, New York.

JUNE 16-20, 1941. Meeting of the Heating, Piping and Air Conditioning National Association. To be held at St. Francis Hotel, San Francisco, Cal.

JUNE 16-20, 1941. Summer Meeting of the American Society of Heating and Ventilating Engineers. To be held at [illegible] Hotel, San Francisco, Cal.

JUNE 23-27, 1941. Annual meeting and exhibit of the American Society for Testing Materials. Palmer House, Chicago, Ill. For information, write Society at 260 So. Broad St., Philadelphia, Pa.

H&V'S PHOTOS

Page 11—Pratt & Whitney, Hartford, Conn.
Page 15—Hedrich-Blessing Studios, Chicago, for the Crane Company.
Page 20—Richard Merrill, Boston, Mass.
Page 33—Electric Furnace Man, Inc., New York.
Page 42—Monarch Machine Tool Co., Sidney, Ohio.

HEATING & VENTILATING

BUYERS' GUIDE

1940—1941

A Directory of Manufacturers of Heating, Ventilating and Air Conditioning Equipment

SEPTEMBER 1940

Published Annually

HEATING & VENTILATING, 148 Lafayette St., New York

ABSORPTION DEHUMIDIFIERS

(See Dehumidifiers)

ACCUMULATORS, COLD

Acme Industries, Inc., Cor. Mechanic & Ganson Sts., Jackson, Mich.
Boester, Carl, F., 101 E. Essex-Kirkwood, St. Louis, Mo.
Frick Co., Waynesboro, Pa.
McQuay, Inc., 1600 Broadway, N. E., Minneapolis, Minn.
Roessing Mfg. Co., 1616 Noble St., Sharpsburg Sta., Pittsburgh, Pa.
Vilter Mfg. Co., 2148 S. First St., Milwaukee, Wis.
X L Refrigerating Co., 1834 W. 59th St., Chicago, Ill.

ADSORBERS, ODOR

Betz Corp., 460 State St., Hammond, Ind.
Dorex Air Conditioning Div., W. B., Connor Engineering Corp., 114 E. 32nd St., New York, N. Y.
Schutte & Koerting Co., 12th & Thompson Sts., Philadelphia, Pa.

ADSORPTION TYPE DEHUMIDIFIERS

(See Dehumidifiers)

AIR CONDITIONERS Remote Heat and Refrigeration

Units containing blower, heating and/or cooling surface, filter, humidifier. Must be connected to heat and/or cooling as desired. Central Type uses ducts for air distribution; floor and ceiling types generally use no ducts.

Central Type (C), Floor or Ceiling Type (B)

Air & Refrigeration Corp., 11 W. 42nd St., New York, N. Y. (C)
Airtemp, Div. of Chrysler Corp., Leo St., Dayton, O. (C) (B)
Allen Co., E. H., 22 Dorrance St., Boston, Mass.
American Blower Corp., 6000 Russell St., Detroit, Mich. (C) (B)
American Radiator & Standard Sanitary Corp., Bessemer Bldg., Pittsburgh, Pa. (C) (B)
Anetsberger Bros., 3505 Elston Ave., Chicago, Ill. (C)
Auburn Burner Co., Auburn, Ind.
Baker Ice Machine Co., Inc., 1508 Evans St., Omaha, Nebr. (C) (B)
Betz Air Conditioning Corp., 1820 Wyandotte St., Kansas City, Mo. (C) (B)
Blower Application Co., 918 N. Fourth St., Milwaukee, Wis. (C)
Buffalo Forge Co., 171 Mortimer St., Buffalo, N. Y. (C) (B)
Carbondale Division, Worthington Pump and Machinery Corp., Harrison, N. J.
Carrier Corp., 302 S. Geddes St., Syracuse, N. Y. (C) (B)
Century Engineering Corp., 401-431 3rd St., S. E., Cedar Rapids, Ia.
Clarage Fan Co., Porter St., Kalamazoo, Mich. (C) (B)
Corozone Air Conditioning Corp., 1422 Euclid Ave., Cleveland, O. (C) (B)
Curtis Refrigerating Machine Co., 1950 Kienlen Ave., St. Louis, Mo. (C) (B)
Dowagiac Steel Furnace Co., Beeson St., Dowagiac, Mich.
Drayer & Hanson, Inc., 738 E. Pico Blvd., Los Angeles, Cal. (C) (B)
Dunham Co., C. A., 450 E. Ohio St., Chicago, Ill. (B)
Fairbanks, Morse & Co., 600 Michigan Ave., Chicago, Ill. (C) (B)
Fedders Mfg. Co.. Inc.. 57 Tonawanda St., Buffalo, N. Y. (C)
Fitzgibbons Boiler Co.. Inc., 101 Park Ave., New York, N. Y. (B)
Fluid Heat Division, Anchor Post Fence Co., Eastern Ave. & Kane St., Baltimore, Md. (C)
Frick Co., Waynesboro, Pa.
Frigidaire Commercial & Air Conditioning Div., General Motors Sales Corp., Dayton, O. (C) (B)
General Electric Co., Air Conditioning and Commercial Refrigeration Dept., Bloomfield, N. J. (C) (B)
General Refrigeration Corp., Shirland Ave., Beloit, Wis. (C) (B)
Governair Corp., 605 W. Main St., Oklahoma City, Okla. (C) (B)
Ilg Electric Ventilating Co., 2850 N. Crawford Ave., Chicago, Ill. (C) (B)
Jaden Mfg. Co., F., Golden Rod Products, Hastings, Nebr. (C) (B)
Kauffman Air Conditioning Corp., 4336 W. Pine Blvd., St. Louis, Mo. (C (B)
Kelvinator Div., Nash-Kelvinator Corp., 14250 Plymouth Rd., Detroit, Mich. (C) (B)
Kennard Inc.. Sam, 3333-35 Market St., St. Louis, Mo.
Kramer Trenton Co., 626 Brunswick Ave., Trenton, N. J. (C) (B)
Marlo Coil Co., 6135 Manchester Ave., St. Louis, Mo.
Majestic Co., 733 Erie St., Huntington, Ind.
McCord Radiator & Mfg. Co., 2587 E. Grand Blvd., Detroit, Mich. (C) (B)
McQuay, Inc., 1600 Broadway, N. E., Minneapolis, Minn. (C) (B)
Modine Mfg. Co., 17th St., Racine, Wis. (C) (B)
Mountain States Equipment Co., 1238 Speer Blvd., Denver, Colo.
Nelson Corp., Herman, The, Moline, Ill. (C)
Niagara Blower Co., 6 E. 45th St., New York, N. Y. (C) (B)
Palmer Mfg. Corp., Phoenix, Ariz.
Patten Co., J. V., 500 De Kalb Ave., Sycamore, Ill.
Peerless of America, Inc., 515 W. 35th St., Chicago, Ill. (C) (B)
Pocahontas Fuel Company, Inc., Stoker Div., 1190 E. 152nd St., Cleveland, O.
Refrigeration Economics Co., Inc., 1232 Second St., N.E., Canton, O. (C) (B)
Richmond Radiator Co., Gas Products Div., Uniontown, Pa. (C)
Simmons Co., Gordon H., 926 Cass St., Milwaukee, Wis.
Sturtevant Co., B. F., Damon St., Hyde Park, Boston, Mass. (C) (B)
Surface Combustion Corp., 2375 Dorr St., Toledo, O. (C)
Trane Co., The, LaCrosse, Wis. (C) (B)
Typhoon Air Conditioning Co., 252 W. 28th St., New York, N. Y. (B)
Unified Air Conditioner Co., Torry Bldg., Duluth, Minn.
U. S. Air Conditioning Corp., Northwestern Terminal, Minneapolis, Minn. (C) (B)
United States Radiator Corp., 1056 National Bank Bldg., Detroit, Mich. (B)
Utica Radiator Corp., 2201 Dwyer Ave., Utica, N. Y. (C)
Webster & Co., Warren, 17th & Federal Sts., Camden, N. J. (B)
Westinghouse Electric & Mfg. Co., Springfield, Mass. (C) (B)
X L Refrigerating Co., 1834 W. 59th St., Chicago, Ill. (C) (B)
York Ice Machinery Corp., Roosevelt Ave., York, Pa. (C) (B)
Young Radiator Co., 709 S. Marquette St., Racine, Wis. (B)

AIR CONDITIONERS Remote Refrigeration, No Heat

Units for floor mounting in room, no ducts; not used for heating; cooling supplied from remote source.

Airgard Mfg. Co., 609 N. LaSalle St.. Chicago, Ill.
Airtemp, Div., of Chrysler Corp., Leo St., Dayton, O.
American Blower Corp., 6000 Russell St., Detroit, Mich.
Ballantyne Co., 222 N. 16th St., Omaha, Nebr.
Carrier Corp., 302 S. Geddes St., Syracuse, N. Y.
Conditionaire Unit Co., 2821 Montrose Ave., Chicago, Ill.
Dunham Co., C. A., 450 E. Ohio St., Chicago, Ill.
Fairbanks, Morse & Co., 600 Michigan Ave., Chicago, Ill.
Frigidaire Commercial & Air Conditioning Div., General Motors Sales Corp., Dayton, O.
General Air Conditioning Corp., 4411 Appleton St., Cincinnati, O.
General Electric Co., Air Conditioning and Commercial Refrigeration Dept., Bloomfield, N. J.
Giant Mfg. Co., South Ave., Council Bluffs, Ia.
Governair Corp., 605 W. Main St., Oklahoma City, Okla.
Hall Mfg. Co., Cedar Rapids, Ia.
Hastings Air Conditioning Co., Inc., Box 481, 615 W. South St., Hastings, Nebr.
Ilg Electric Ventilating Co., 2850 N. Crawford Ave., Chicago, Ill.
Jaden Mfg. Co., F., Golden Rod Products, Hastings, Nebr.
Kauffman Air Conditioning Corp., 4336 W. Pine Blvd., St. Louis, Mo.
Kelvinator Div., Nash-Kelvinator Corp., 14250 Plymouth Rd., Detroit, Mich.
Kennard, Inc., Sam, 3333 Market St., St. Louis, Mo.
King Ventilating Co., Box 178, Owatonna, Minn.
Larkin Coils, Inc., 519 Memorial Dr., S. E., Atlanta, Ga.
Nesbitt, Inc., John J., & Buckeye Blower Co., State Rd. & Rhawn St., Philadelphia, Pa.
Nevinger Mfg. Co., Greenville, Ill.
Norge Div., Borg-Warner Corp., 670 E. Woodbridge St., Detroit, Mich.
Norwin Co., E. Album St., Freeport, Ill.
Standard Air Conditioning, Inc., 50 W. 40th St., New York, N. Y.
Sturtevant Co., B. F., Damon St., Hyde Park, Boston, Mass.
Trane Co., The, La Crosse, Wis.
Unified Air Conditioner Co., Torry Bldg., Duluth, Minn.
Westinghouse Electric & Mfg. Co., Springfield, Mass.
Western Blower Co., 1800 Airport Way, Seattle, Wash.
X L Refrigerating Co., 1834 W. 59th St., Chicago, Ill.
York Ice Machinery Corp., Roosevelt Ave., York, Pa.
Young Radiator Co., 709 S. Marquette St., Racine, Wis.

AIR CONDITIONERS Evaporative Cooling Type

Air & Refrigeration Corp., 11 W. 42nd St., New York, N. Y.
Air-O-Line Co.. The, 1101-1107 McKinney, St., Dallas, Tex.
Atlas Heating & Ventilating Co., Ltd., 557 Fourth St., San Francisco, Cal.
Buffalo Forge Co., 171 Mortimer St., Buffalo, N. Y.
Coolmaster Corp., 530 S. Dearborn St., Chicago, Ill.
Dallas Engineering Co., Inc., 1115 Hall, Dallas, Tex.
Economy Electric Mfg. Co., 4606 W. 21st Pl., Chicago, Ill.
Fairbanks, Morse & Co., 600 Michigan Ave., Chicago, Ill.
Hall Mfg. Co., Cedar Rapids, Ia.
Montag Stove & Furnace Works, 2011 N. Columbia Blvd., Portland, Ore.
Mountain States Equipment Co., 1238 Speer Blvd., Denver, Colo.
Palmer Mfg. Corp., Phoenix, Ariz.
Payne Furnace & Supply Co., Inc., 336-338 N. Foothill Rd., Beverly Hills, Cal.
Pernot & Rich, Inc., 2546 San Fernando Rd., Los Angeles, Cal.
Spray-Wheel Air Conditioners, Inc., 1320 Nineteenth St., Denver, Colo.
Sturtevant Co., B. F., Damon St., Hyde Park, Boston, Mass.
Todd Air Conditioning Co., Inc., Bonner Springs, Kans.
U. S. Air Conditioning Corp., 2101 Kennedy St., N. E., Minneapolis, Minn.
Utility Fan Corp., 2528 Santa Fe Ave., Los Angeles, Cal.
Western Blower Co., 1800 Airport Way, Seattle, Wash.
Young Radiator Co., 709 S. Marquette St., Racine, Wis.
X L Refrigerating Co., 1834 W. 59th St., Chicago, Ill.

AIR CONDITIONERS Industrial Unit Type

Air & Refrigeration Corp., 11 W. 42nd St., New York, N. Y.
American Blower Corp., 6000 Russell St., Detroit, Mich.
Anetsberger Bros., 3505 Elston Ave., Chicago, Ill.
Bahnson Co., R. J., Reynolds Bldg., Winston-Salem, N. C.
Baker Ice Machine Co., Inc., 1508 Evans St., Omaha, Nebr.
Betz Air Conditioning Corp., 1820 Wyandotte St., Kansas City, Mo.
Brundage Co., 514 N. Park St., Kalamazoo, Mich.
Buffalo Forge Co., 171 Mortimer St., Buffalo, N. Y.
Carbondale Div., Worthington Pump & Machinery Corp., Harrison, N. Y.
Carrier Corp., 302 S. Geddes St., Syracuse, N. Y.
Clarage Fan Co., Porter St., Kalamazoo, Mich.
Curtis Refrigerating Machine Co., 1950 Kienlen Ave., St. Louis, Mo.
Drayer & Hanson, Inc., 738 E. Pico Blvd., Los Angeles, Cal.
Economy Equipment Co., Inc., 233 N. Wolcott Ave., Chicago, Ill.
Fairbanks, Morse & Co.. 600 Michigan Ave., Chicago, Ill.
Fedders Mfg. Co., Inc., 57 Tonawanda St., Buffalo, N. Y.
Frick Co., Waynesboro, Pa.
General Refrigeration Div., Yates-American Machine Co., Beloit, Wis.
Howe Ice Machine Co., 2825 Montrose Ave., Chicago, Ill.
Industrial Mfg. & Engineering Co., 3845 N. Ravenswood Ave., Chicago, Ill.
International Moistening Co., 489 S. Main St., Providence, R. I.
Kauffman Air Conditioning Corp., 4336 W. Pine Blvd., St. Louis. Mo.
McQuay, Inc., 1600 Broadway, N. E., Minneapolis, Minn.
Niagara Blower Co., 6 E. 45th St., New York, N. Y.
Parks-Cramer Co., 970 Main St., Fitchburg, Mass.
Pfening Co., Fred D., The, 1075 W. 5th Ave., Columbus, O.
Refrigeration Economics Co., Inc., 1232 Second St., N. E., Canton, O.
Research Corp., Chrysler Bldg., New York, N. Y.
Ross Engineering Corp., J. O., 350 Madison Ave., New York, N. Y.
Somers Inc., H. J., 6063 Wabash Ave., Detroit, Mich.
Spray-Wheel Air Conditioners, Inc., 1320 Nineteenth St., Denver, Colo.
Sturtevant Co., B. F., Damon St., Hyde Park, Boston, Mass.
Trane Co., The, La Crosse, Wis.
Vilter Mfg. Co., 2148 S. First St., Milwaukee, Wis.
X L Refrigerating Co., 1834 W. 59th St., Chicago, Ill.
York Ice Machinery Corp., Roosevelt Ave., York, Pa.

AIR CONDITIONERS Summer, Self-Contained

Units for floor or window mounting in room, no ducts; not used for heating, but have refrigeration compressor located inside cabinet.

Room Floor Cabinets: Under 3 hp. (R); 3 hp. and over (S)

Airtemp, Div. of Chrysler Corp., Leo St., Dayton, O. (R) (S)
Apex Rotarex Corp., 1070 E. 152nd St., Cleveland, O.

Baker Ice Machine Co., Inc., 1508 Evans St., Omaha, Neb. (S)
Buffalo Forge Co., 171 Mortimer St., Buffalo, N. Y.
Carbondale Division, Worthington Pump & Machinery Corp., Harrison, N. J. (R) (S)
Carrier Corp., 302 S. Geddes St., Syracuse, N. Y. (R) (S)
Clarage Fan Co., Porter St., Kalamazoo, Mich. (S)
Corozone Air Conditioning Corp., 1422 Euclid Ave., Cleveland, O. (R)
Curtis Refrigerating Machine Co., 1950 Kienlen Ave., St. Louis, Mo. (R) (S)
Electrol, Inc., 934 Main Ave., Clifton, N. J. (R)
Fairbanks, Morse & Co., 600 Michigan Ave., Chicago, Ill. (R) (S)
Forman Machine & Electric Corp., 550 Seventh Ave., New York, N. Y. (S)
Frick Co., Waynesboro, Pa. (S)
Frigidaire Commercial & Air Conditioning Div., General Motors Sales Corp., Dayton, O. (R) (S)
Gale Products, Galesburg, Ill. (R)
General Electric Co., Air Conditioning & Commercial Refrigeration Dept., 5 Lawrence St., Bloomfield, N. J. (R) (S)
General Refrigeration Div., Yates-American Machine Co., Beloit, Wis. (R) (S)
Gilbert & Barker Mfg. Co., Springfield, Mass. (R)
Harvey-Whipple, Inc., 55 Emery St., Springfield, Mass. (R)
Ice Cooling Appliance Corp., Morrison, Ill. (R)
Ilg Electric Ventilating Co., 2850 N. Crawford Ave., Chicago, Ill. (R)
Indian Trailer Corp., Koolroom Div. 2338 Indiana Ave, Chicago, Ill. (R)
Kauffman Air Conditioning Corp., 4336 W. Pine Blvd., St. Louis, Mo. (R) (S)
Kelvinator Div., Nash-Kelvinator Corp., 14250 Plymouth Rd., Detroit, Mich. (R) (S)
Mayflower Air-Conditioners, Inc., E. 7th St. at Duluth, St. Paul, Minn. (R)
National Standard Air Products Co., 325 W. Huron St., Chicago, Ill. (R)
Niagara Blower Co. 6 E. 45th St., New York, N. Y. (S)
Norge Div., Borg-Warner Corp., 670 E. Woodbridge St., Detroit, Mich. (R) (S)
Peerless of America, Inc., 515 W. 35th St., Chicago, Ill.
Philco Radio & Television Corp., 3710 N. Broad St., Philadelphia, Pa. (R)
Pleasantaire Corp., Tower Bldg., Washington, D. C. (R)
Ranco Inc., 601 W. 5th Ave., Columbus, O.
Spray-Wheel Air Conditioners, Inc., 1320 Nineteenth St., Denver, Colo.
Standard Air Conditioning, Inc., 50 W. 40th St., New York, N. Y. (R)
Trane Co., The, La Crosse, Wis. (R)
Typhoon Air Conditioning Co., 252 W. 26th St., New York, N. Y. (S)
Vilter Mfg. Co., 2148 S. First St., Milwaukee, Wis. (S)
Westinghouse Electric & Mfg. Co., Springfield, Mass. (R) (S)
York Ice Machinery Corp., Roosevelt Ave., York, Pa. (R) (S)
Young Radiator Co., 709 S. Marquette St., Racine, Wis.

AIR CONDITIONERS
Remote Heat, No Refrigeration

Units containing a blower, filter, heating surface, and humidifier. Intended for winter heating only. Are really a cabinet gravity convector heater with fan and filter added. Must be connected to source of heat.

Air & Refrigeration Corp., 11 W. 42nd St., New York, N. Y.
American Blower Corp., 6000 Russell St., Detroit, Mich.
Automatic Burner Corp., 1823 Carroll Ave., Chicago, Ill.
Apex Rotarex Corp., 1070 E. 152nd St., Cleveland, O.
Burnham Boiler Corp., Main St., Irvington, N. Y.
Campbell Heating Co., 31st & Dean, Des Moines, Ia.
Carrier Corp., 302 S. Geddes St., Syracuse, N. Y.
Century Engineering Corp., 401-431 3rd St., Cedar Rapids, Ia.
Clarage Fan Co., Porter St., Kalamazoo, Mich.
Dowagiac Steel Furnace Co., Beeson St., Dowagiac, Mich.
Drayer & Hanson, Inc., 738 E. Pico Blvd., Los Angeles, Cal.
Dunham Co., C. A., 450 E. Ohio St., Chicago, Ill.
Easternoil, Inc., 133 Marginal Way, Portland, Me.
Electrol, Inc., 934 Main St., Clifton, N. J.
Fairbanks, Morse & Co., 600 Michigan Ave., Chicago, Ill.
Fitzgibbons Boiler Co., Inc., 101 Park Ave., New York, N. Y.
Frigidaire Commercial & Air Conditioning Div., General Motors Sales Corp., Dayton, O.
Furblo Co., Hermansville, Mich.
General Electric Co., Air Conditioning & Commercial Refrigeration Dept., Bloomfield, N. J.
Hastings Air Conditioning Co., Inc., Box 481, 615 W. South St., Hastings, Nebr.
Heating Equipment Co., 1123 Harrison Ave., San Francisco, Calif.
Ilg Electric Ventilating Co., 2850 N. Crawford Ave., Chicago, Ill.
Jaden Mfg. Co., F., Golden Rod Products, Hastings, Nebr.
Kauffman Air Conditioning Corp., 4336 W. Pine Blvd., St. Louis, Mo.
Majestic Co., 733 Erie St., Huntington, Ind.
McCord Radiator & Mfg. Co., 2587 E. Grand Blvd., Detroit, Mich.
McQuay, Inc., 1600 Broadway, N.E. Minneapolis, Minn.
Nelson Corporation, The, Herman, Moline, Ill.
Nesbitt, Inc., John J., & Buckeye Blower Co., State Rd., & Rhawn St., Philadelphia, Pa.
Norge Div., Borg-Warner Corp., 670 E. Woodbridge St., Detroit, Mich.
Palmer Mfg. Corp., Phoenix, Ariz.
Patten Co., J. V., 500 De Kalb Ave., Sycamore, Ill.
Penn Boiler & Burner Mfg. Co., Lancaster, Pa.
Refrigeration Economics Co., Inc., 1232 Second St., N. E., Canton, O.
Reif-Rexoil, Inc., 37-43 Carroll St., Buffalo, N. Y.
Reznor Mfg. Co., Mercer, Pa.
Richmond Radiator Co., Gas Products Div., Uniontown, Pa.
Roberts-Hamilton Co., 707-715 S. Third St., Minneapolis, Minn.
Somers, Inc., H. J., 6063 Wabash Ave., Detroit, Mich.
Standard Air Conditioning, Inc., 50 W. 40th St., New York, N. Y.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.
Trane Co., The, La Crosse, Wis.
U. S. Air Conditioning Corp., 2101 Kennedy St., N. E., Minneapolis, Minn.
Unified Air Conditioner Co., Torry Bldg., Duluth, Minn.
Utility Fan Corp., 2528 Santa Fe Ave., Los Angeles, Cal.
Vapor Specialty Co., 101 W. 42nd St., New York, N. Y.
Westinghouse Electric & Mfg. Co., Springfield, Mass.
York Ice Machinery Corp., Roosevelt Ave., York, Pa.
Young Radiator Co., 709 S. Marquette St., Racine, Wis.

AIR DIFFUSERS
(See Diffusers, Air)

AIR FILTERS
(See Filters Air, Automatic. Filters, Air, Electric Precipitation and Filters, Air, Unit.)

AIR METERS
(See Meters, Air Velocity)

AIR PRESSURE REGULATORS
(See Regulators, Air Pressure)

AIR VELOCITY REGULATORS
(See Regulators, Air Velocity)

AIR VENTS
(See Vents, Air)

AIR WASHERS
Air & Refrigeration Corp., 11 W. 42nd St., New York, N. Y.
Allen Co., E. H., 22 Dorrance St., Boston, Mass.
American Blower Corp., 6000 Russell St., Detroit, Mich.
Ames Co., W. R., 150 Hooper St., San Francisco, Cal.
Atlas Heating & Ventilating Co., Ltd., 557 Fourth St., San Francisco, Cal.
Autovent Fan & Blower Co., 1811-27 N. Kostner Ave., Chicago, Ill.
Ballantyne Co., 222 N. 16th St., Omaha, Neb.
Bayley Blower Co., 1817 S. 66th St., Milwaukee, Wis.
Belanger Fan & Blower Co., 1230 18th St., Detroit, Mich.
Betz Air Conditioning Corp., 1820 Wyandotte St., Kansas City, Mo.
Bishop & Babcock Mfg. Co., 4901 Hamilton Ave., Cleveland, O.
Blower Application Co., 918 N. Fourth St., Milwaukee, Wis.
Brassert Co., 310 S. Michigan, Chicago, Ill.
Brundage Co., 514 N. Park St., Kalamazoo, Mich.
Bubar, Hudson H., 15 Park Row, New York, N. Y.
Buffalo Forge Co., 171 Mortimer St., Buffalo, N. Y.
Campbell Heating Co., E. K., 2445 Charlotte St., Kansas City, Mo.
Carrier Corp., 302 S. Geddes St., Syracuse, N. Y.
Century Engineering Corp., 401-431 3rd St., S.E., Cedar Rapids, Ia.
Clarage Fan Co., Porter St., Kalamazoo, Mich.
Columbus Heating & Ventilating Co., 182 N. Yale Ave., Columbus, O.
Dail Steel Products Co., 2000 Main St., Lansing, Mich.
Electrovent Fan & Mfg. Co., 812 W. Lake St., Chicago, Ill.
Gehri Co., 1117 Tacoma Ave., Tacoma, Wash.
Hall Mfg Co., Cedar Rapids, Ia.
Industrial Sheet Metal Works, Inc., 628 E. Forest Ave., Detroit, Mich.
Kauffman Air Conditioning Corp., 4336 W. Pine Blvd., St. Louis, Mo.
King Ventilating Co., Box 178, Owatonna, Minn.
Magirl Foundry & Furnace Wks., P. H., 413 E. Oakland Ave., Bloomington, Ill.
Mellish & Murray Co., 1715 Carroll Ave., Chicago, Ill.
Mountain States Equipment Co., 1238 Speer Blvd., Denver, Colo.
Mueller Furnace Co., L. J., 2005 W. Oklahoma Ave., Milwaukee, Wis.
New York Blower Co., 3155 Shields Ave., Chicago, Ill.
Niagara Blower Co., 6 E. 45 St., New York, N. Y.
Northern Blower Co., 6409 Barberton Ave., Cleveland, O.
Parks-Cramer Co., 970 Main St., Fitchburg, Mass.
Phillips Cooling Tower Co., Inc., 15 John St., New York, N. Y.
Spray Engineering Co., 114 Central St., Somerville, Mass.
Spray-Wheel Air Conditioners, Inc., 1320 Nineteenth St., Denver, Colo.
Stokermatic Co., The, 1415 S. State St., Salt Lake City, Utah.
Strandwitz & Co., Inc., W. J., Jefferson and Master Sts., Camden, N. J.
Sturtevant Co., B. F., Damon St., Hyde Park, Boston, Mass.
Supreme Heater & Ventilating Corp., 1911 N. Market St., St. Louis, Mo.
Todd Air Conditioning Co., Inc., Bonner Springs, Kans.
Trane Co., The, La Crosse, Wis.
Typhoon Air Conditioning Co., 252 W. 26th St., New York, N. Y.
U. S. Air Conditioning Corp., 2101 Kennedy St., N. E., Minneapolis, Minn.
Unit Heater & Cooler Co., 1002-1024 Third St., Wausau. Wis.
Utica Radiator Corp., 2201 Dwyer Ave., Utica, N. Y.
Utility Fan Corp., 2528 Santa Fe Ave., Los Angeles, Cal.
Vilter Mfg. Co., 2148 S. First St., Milwaukee, Wis.
Western Blower Co., 1800 Airport Way, Seattle, Wash.
York Ice Machinery Corp., Roosevelt Ave., York, Pa.

ALARMS, BOILER
(See Boiler Alarms)

ANALYZERS, CO_2
Bacharach Industrial Instrument Co., 7000 Bennett St., Pittsburgh, Pa.
Barclay, Inc., Robert, 128 N. Peoria St., Chicago, Ill.
Defender Automatic Regulator Co., 308 S. 8th St., St. Louis, Mo.
Dwyer Mfg. Co., F. W., 565 W. Washington Blvd., Chicago, Ill.
Ellison Draft Gage Co., 214 W. Kinzie St., Chicago, Ill.
Engelhard, Inc., Chas., 90 Chestnut St., Newark, N. J.
Friez & Sons, Julien P., 4 N. Central Ave., Baltimore, Md.
General Scientific Equipment Co., 2735 N. Broad St., Philadelphia, Pa.
Hays Corp., E. 8th St., Michigan City, Ind.
Hotstream Heater Co., The, 8007 Grand Ave., Cleveland, O.
Huyette Co,, Inc., Paul B., 401 N. Broad St., Philadelphia, Pa.
Preferred Utilities Mfg. Corp., 33 W. 60th St., New York, N. Y.
Republic Flow Meters Co., 2240 Diversey Pkwy., Chicago. Ill.
Weaver Mfg. Co., Springfield, Ill.

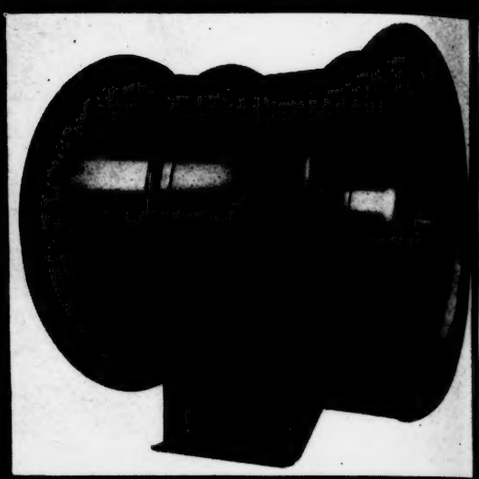
ANEMOMETERS
(See also Meters, Air Velocity)

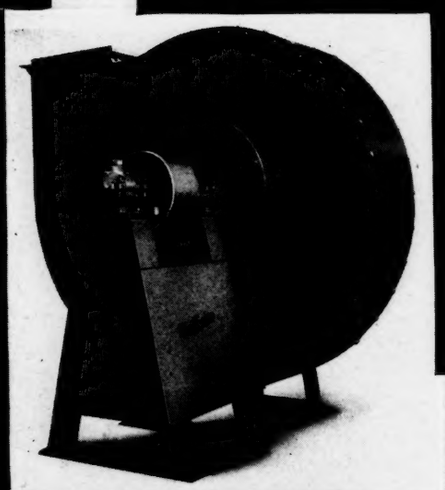
American Instrument Co., Silver Spring, Md.
Bristol Co., Platts Bridge, Waterbury, Conn.
Friez & Sons, Julien P., 4 N. Central Ave., Baltimore, Md.
G. M. Mfg. Co., P. O. Box 151, Madison Square Sta., New York, N. Y.
General Scientific Equipment Co., 2735 N. Broad St., Philadelphia, Pa.
Hill, E. Vernon, 6826 W. Highland Ave., Chicago, Ill.
Illinois Testing Laboratories, 419 N. La Salle St., Chicago, Ill.
Precision Thermometer & Instrument Co., 1434 Brandywine St., Philadelphia, Pa.
Taylor Instrument Companies, 95 Ames St., Rochester, N. Y.
Wilson Products, Inc., 348 Thorn St., Reading, Pa.

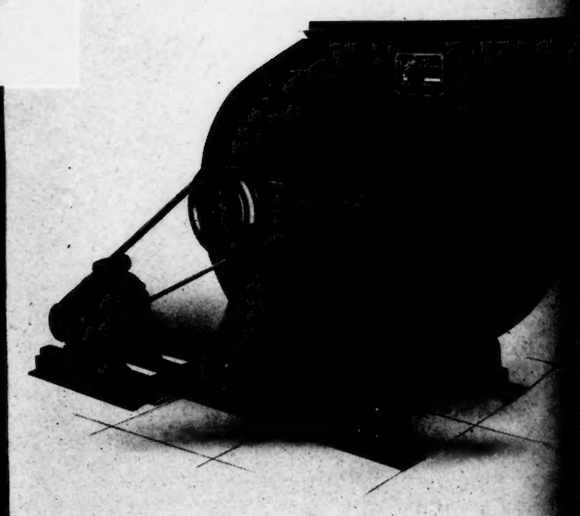
ASBESTOS PIPE
(See Pipe, Asbestos Cement)

ASSEMBLIES, CONTROL
(See Control Assemblies)

Grow WITH TODAY'S INDUSTRIAL





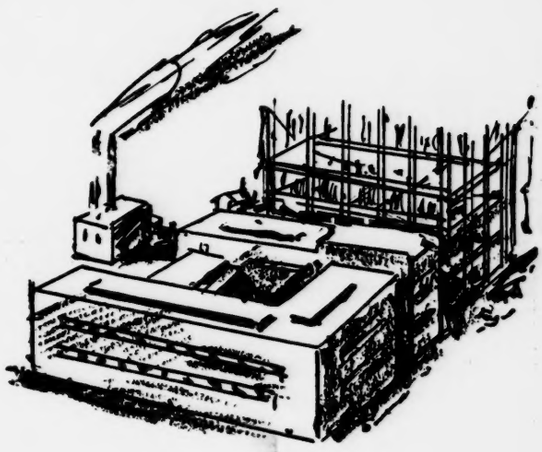


BUFFALO FORGE

EXPANSION . .

Alert to widespread industrial expansion occasioned by our great program of National Preparedness, Buffalo production is geared to meet—promptly—the demands for air-handling equipment in step with today's industrial planning.

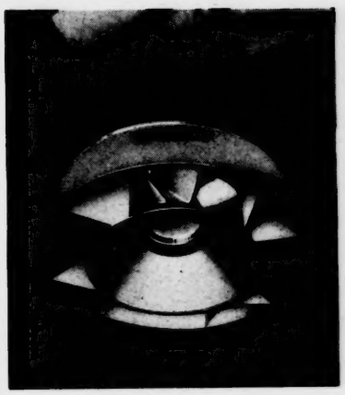
The wide range of types and sizes of Buffalo Fans provides industry with equipment for the efficient, dependable, economical handling of air in all its manifold applications.



In cases where specially designed fans are indicated, Buffalo engineers are ready to cooperate in developing the correct equipment to meet the specific set of conditions.

Heating contractors and consulting engineers are urged to get complete information today on Buffalo equipment for forced and induced draft, ventilating, exhausting waste, heating, as well as air conditioning.

FOR *Effective* **INDUSTRIAL HEATING**



"BUFFALO" VD Heater-Ventilator

Ideal for large area heating in high-ceiling buildings. Effectively delivers heat downward 15 to 50 ft., with 4-way distribution. Serves the dual purpose of heating in winter and ventilating in summer. Bulletin 3231.

"Buffalo" Breezo-Fin Unit Heater

An attractive, sturdily-built heater for smaller working areas and wherever warmth is required for special or isolated areas. Adjustable louvres for directional effectiveness. Available in 5 sizes, 12" to 24" in diameter. Also supplied in NEW Midget size, 8" fan, ideal for factory offices. Bulletin 3137-B.

COMPANY

480 BROADWAY, BUFFALO, N. Y.
Branch Engineering Offices in Principal Cities
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

Silence
IN FANS, BLOWERS AND
AIR CONDITIONING EQUIPMENT IS ESSENTIAL
RUBBER
(Neoprene)
PRECISION
BEARING
METAL
CJB
EDR
CJB
AHLBERG
RUBBER (Neoprene)
INSULATED
PILLOW BLOCKS
insure
silence
Sound-insulated by a cushion of oil-proof Neoprene, this new CJB Ahlberg Pillow Block provides quiet anti-friction efficiency for air-conditioning equipment. It is the ideal precision unit for silent operation and economical installations on light-duty equipment.
Its trim all-metal housing and frictionless, labryinth-type seals provide full protection for its quality CJB Ball Bearings.
Write for Bulletin EDR which gives full specifications and prices.
AHLBERG BEARING COMPANY
Manufacturers of CJB Master Ball Bearings
3011 West 47th Street - - - Chicago, Ill., U.S.A.

ATTIC FANS

(See Fans, Night Cooling)

BAFFLES
Oil Burner, Stoker, and Gas

Automatic Gas Equipment Co., 301 Brushton Ave., Pittsburgh, Pa.
Dickson Coal Co., Inc., 17 Battery Pl., New York, N. Y.
McLeod & Henry Co., Inc., Troy, N. Y.
Mexico Refractories Co., Mexico, Mo.
Standard Fuel Engineering Co., 667 Post Ave., South, Detroit, Mich.

BALL BEARINGS

(See Bearings, Ball)

BASES, MOTOR
Belt Tension Adjusting

Alexander Bros., 406 N. 3rd St., Philadelphia, Pa.
American Pulley Co., 4200 Wissahickon Ave., Philadelphia, Pa.
Browning Mfg. Co., Inc., 1940 Browning Blvd., Maysville, Ky.
General Electric Co., 1 River Rd., Schenectady, N. Y.
Ideal Commutator Dresser Co., 4169 Park Ave., Sycamore, Ill.
Manley Products Corp., State & Hay Sts., York, Pa.
Rockford Mfg. Co., 1801-2001 English Ave., Indianapolis, Ind.

BASE PADS
For Isolating Vibration

Armstrong Cork Co., 994 Concord St., Lancaster, Pa.
Atlas Asbestos Co., Ltd., 110 McGill St., Montreal, Que., Canada
Buffalo Forge Co., 171 Mortimer St., Buffalo, N. Y.
Butterworth, B. T. Jr., Oak St., New Canaan, Conn.
Clarage Fan Co., Porter St., Kalamazoo, Mich.
Cork Import Corp., 330 W. 42nd St., New York, N. Y.
Cork Insulation Co., Inc., 155 E. 44th St., New York, N. Y.
Fabling Co., W. D., 722 N. Broadway, Los Angeles, Cal.
Felters Co., Inc., 210 South St., Boston, Mass.
Firestone Tire & Rubber Co., S. Main St., Akron, O.
Gates Rubber Co., 999 S. Broadway, Denver, Colo.
Goodrich Co., B. F., 548 S. Main St., Akron, O.
Johns-Manville, 22 E. 40th St., New York, N. Y.
Keldur Corp., 420 Lexington Ave., New York, N. Y.
Korfund Co., 48-15 32nd Pl., Long Island City, N. Y.
Lord Mfg. Co., 1633 W. 12th St., Erie, Pa.
Manley Products Corp., State & Hay Sts., York, Pa.
Mundet Cork Corp., 65 S. 11th St., Brooklyn, N. Y.
National Lead Co., 111 Broadway, New York, N. Y.
Sturtevant Co., B. F., Damon St., Hyde Park, Boston, Mass.
United Cork Companies, Central Ave., Kearny, N. J.
Vibration Eliminator Co., 25-08 37th St., Long Island City, N. Y.
Western Felt Works, 4029-4117 Ogden Ave., Chicago, Ill.

BEARINGS, BALL

Ahlberg Bearing Co., 3011 W. 47th St., Chicago, Ill.
Bearings Co. of America, 501 Harrisburg Ave., Lancaster, Pa.
Dodge Mfg. Corp., 500 S. Union St., Mishawaka, Ind.
Fafnir Bearing Co., 37 Booth St., New Britain, Conn.
Link-Belt Co., 519 N. Holmes Ave., Indianapolis, Ind.
Marlin-Rockwell, Jamestown, N. Y.
New Departure Div., General Motors Sales Corp., Bristol, Conn.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
SKF Industries, Inc., Front St., & Erie Ave., Philadelphia, Pa.
Schatz Mfg. Co., Fairview, Poughkeepsie, N. Y.
Shafer Bearing Corp., 35 E. Wacker Dr., Chicago, Ill.
Stephens-Adamson Mfg. Co., Aurora, Ill.
Wood's Sons Co., T. B., 1275 Fifth Ave., Chambersburg, Pa.

BEARINGS, PILLOW BLOCK

Ahlberg Bearing Co., 3011 W. 47th St., Chicago, Ill.
Air Controls, Inc., 9205 Detroit Ave., Cleveland, O.
Dodge Mfg. Corp., 500 So. Union St., Mishawaka, Ind.
Fafnir Bearing Co., 37 Booth St., New Britain, Conn.
Hastings Air Conditioning Co., 108 So. Colorado Ave., Hastings, Neb.
Jeffrey Mfg. Co., 956 N. Fourth St., Columbus, O.
Lau Blower Co., 2001 Home Ave., Dayton, O.
Link-Belt Co., 307 N. Michigan Ave., Chicago, Ill.
Randall Graphite Products Corp., 609 W. Lake St., Chicago, Ill.
SKF Industries, Inc., Front St. & Erie Ave., Philadelphia, Pa.
Schwitzer-Cummins Co., Fan St., Indianapolis, Ind.
Sprout Waldron & Co., Muncy, Pa.
Stephens-Adamson Mfg. Co., Aurora, Ill.
Viking Air Conditioning Corp., 9500 Richmond Ave., Cleveland, O.

BELLOWS, THERMOSTATIC

Bishop & Babcock Mfg. Co., 4901 Hamilton Ave., Cleveland, O.
Bridgeport Thermostat Co., Inc., Connecticut Ave., Bridgeport, Conn.
Cashin Co., W. D., 69 A St., Boston, Mass.
Clifford Mfg. Co., 564 E. First St., Boston, Mass.
Cook Electric Co., 2700 Southport Ave., Chicago, Ill.
Fulton Sylphon Co., Knoxville, Tenn.
Sterling, Inc., 3738 N. Holton St., Milwaukee, Wis.

BELTING, FLAT
Leather (L), Rubber (R)

Alexander Bros., Inc., 406 N. 3rd St., Philadelphia, Pa. (L)
Boston Woven Hose & Rubber Co., Broadway, Cambridge, Mass. (R)
Browning Mfg. Co., Inc., 1940 Browning Blvd., Maysville, Ky.
Chicago Belting Co., 113-125 N. Green St., Chicago, Ill. (L)
Continental Rubber Wks., 1905 Liberty Blvd., Erie, Pa. (R)
Dick Co., Inc., R. & J., 24-48 Sade St., Passaic, N. J. (R)
Firestone Tire & Rubber Co., S. Main St., Akron, O. (R)
Garlock Packing Co., 50 Main St., Palmyra, N. Y. (R)
Gilmer Co., L. H., 7230 Keystone St., Tacony, Philadelphia, Pa. (R)
Goodrich Co., B. F., 548 S. Main St., Akron, O. (R)
Goodyear Tire & Rubber Co., E. Market St., Akron, O. (R)
Graton & Knight Co., 356 Franklin St., Worcester, Mass. (L)
Hamilton Rubber Mfg. Co., Mead St., Trenton, N. J. (R)
Houghton & Co., E. F., 240 W. Somerset St., Philadelphia, Pa. (L)

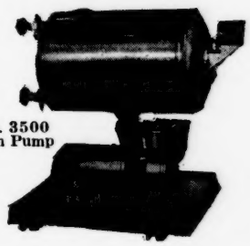
SAVE FUEL . . . . SAVE SERVICE EXPENSE . .

BOOST HEATING PLANT EFFICIENCY

WITH STERLING PRODUCTS

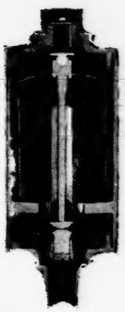
For all STEAM, VAPOR, VACUUM and HOT WATER SYSTEMS

Sterling No. 4000 Under or Above Ground "Lowboy" Condensation Pump



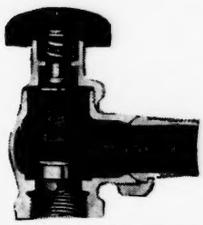
Sterling No. 3500 Condensation Pump

Sterling No. 3700 Underground Condensation Pump



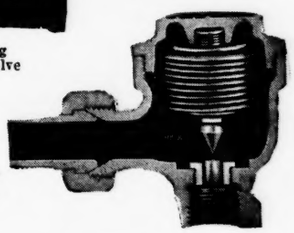
Sterling No. 15 Vacuum Float Vent

Sterling No. 27 Boiler Return Traps



Sterling No. 22A Bellows Packless Radiator Valve

Sterling Flow Valve

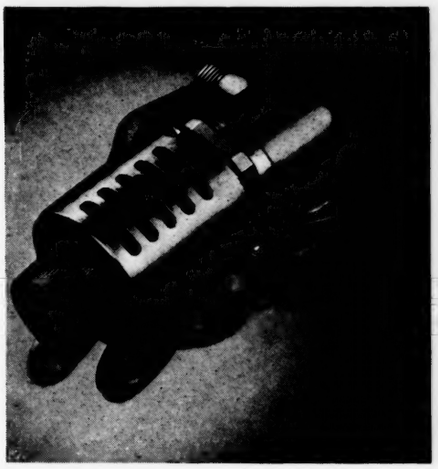


Sterling No. 7 Bellows Trap

STERLING Thermotrol

(INDIVIDUAL RADIATOR CONTROLS)

New Streamline Model



Buildings everywhere are saving up to 25% of their previous fuel bill since installing THERMOTROLS!

Sterling THERMOTROLS installed on the Radiators of every room in your building, avoid uncomfortable, "on and off" heating, expensive OVERHEATING, assure comfortable temperatures in hard-to-heat rooms without boosting your heat load in other rooms—keep your boilers operating at lower capacity, thus reducing fuel consumption.

THERMOTROLS require no motors, electricity, compressed air, separate thermostats, or extra piping. Each is a completely self-contained thermostatically operated unit, and can be installed on the radiator in a very short time. Low First Cost . . . Low Installation Cost.

FREE 60-DAY ROOM TRIAL!

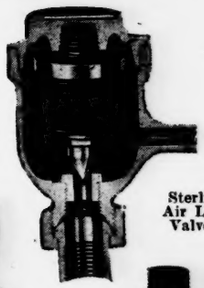
Install THERMOTROLS in one or two Rooms now giving you "Overheating Trouble." If THERMOTROLS do not satisfactorily control room temperature, you may return them within 60 days —at NO COST TO YOU.

STERLING THERMOTROLS

(INDIVIDUAL RADIATOR CONTROLS)

For two-pipe Steam, Vapor, and Vacuum Heating Plants, and one- or two-pipe Hot Water Systems. At right: Model G for Concealed Radiators.

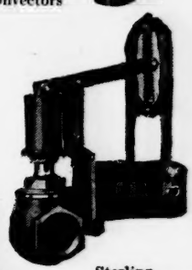
Sterling Self-Cleaning Strainers



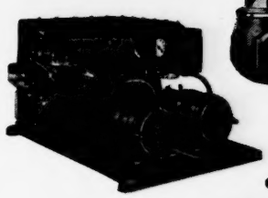
Sterling Air Line Valve

Sterling No. 7 Vertical Trap for Convectors

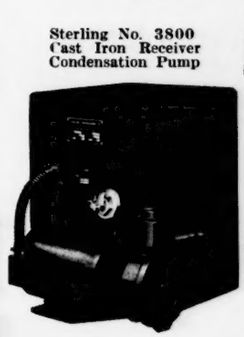
Sterling Hot Water Circulator



Sterling Motorized Valve



Sterling Duplex Vacuum and Condensation Pump



Sterling No. 3800 Cast Iron Receiver Condensation Pump

Sterling No. 111 Tank Control

No. 69 Float and Thermostatic Traps

—Designed especially for Unit Heaters and Unit Ventilators. A small, highly efficient Valve, Hydron Bellows vacuum filled, with air bypass. Suitable for all steam conditions from 25" vacuum to 20 lbs. pressure. Heavy copper float operates water valve. Can be cleaned without disturbing piping.

Popular . . .

STERLING, Inc.

3732 N. HOLTON STREET
MILWAUKEE, WISCONSIN

Sterling Products

Built . . .

for the BUILDING

Jeffrey Mfg. Co., 956 N. Fourth St., Columbus, O. (R)
Manhattan Rubber Mfg. Div., of Raybestos-Manhattan, Inc., 61 Willett St., Passaic, N. J.
Republic Rubber Div., Lee Rubber & Tire Corp., Youngstown, O. (R)
Rhoads & Sons, J. E., 35 N. Sixth St., Philadelphia, Pa. (L)
Rockwood Mfg. Co., 1801-2001 English Ave., Indianapolis, Ind. (R)
Schieren Co., Chas. A., 30-38 Ferry St., New York, N. Y. (L)
Thermoid Rubber Co., Whitehead Rd., Trenton, N. J. (R)
United States Rubber Co., 1790 Broadway, New York, N. Y.(R)
Williams & Son, I. B., Dover, N. H. (L)

BELTS, V-TYPE

Allis-Chalmers Mfg. Co., 1126 S. 70 St., Milwaukee, Wis.
American Pulley Co., 4200 Wissahickon Ave., Philadelphia, Pa.
Browning Mfg. Co., Inc., 1940 Browning Blvd., Maysville, Ky.
Chicago Belting Co., 113-125 N. Green St., Chicago, Ill.
Continental Rubber Wks., 1905 Liberty Blvd., Erie, Pa.
Dayton Rubber Mfg. Co., 2345 W. Riverview Ave., Dayton, O.
Dick Co., Inc., R. & J., 24-48 Sade St., Passaic, N. J.
Gates Rubber Co., 999 S. Broadway, Denver, Colo.
Gilmer Co., L. H., 7230 Keystone St., Tacony, Philadelphia, Pa.
Goodrich Co., B. F., 548 S. Main St., Akron, O.
Goodyear Tire & Rubber Co., E. Market St., Akron, O.
Jones Foundry & Machine Co., W. A., 4401 Roosevelt Rd., Chicago, Ill.
Manhattan Rubber Mfg. Div., of Raybestos-Manhattan, Inc., 61 Willett St., Passaic. N. J.
Medart Co., 3500 DeKalb, St. Louis, Mo.
Raybestos-Manhattan, Inc., 61 Willett St., Passaic, N. J.
Republic Rubber Div., Lee Rubber & Tire Corp., Youngstown, O.
Rockwood Mfg. Co., 1801-2001 English Ave., Indianapolis, Ind.
Thermoid Rubber Co., Whitehead Rd., Trenton, N. J.
United States Rubber Co., 1790 Broadway, New York, N. Y.
Wood's Sons Co., T. B., 1275 Fifth Ave., Chambersburg, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.

BI-METAL, THERMOSTATIC

Chace Co., W. M., 1606 Beard Ave., Detroit, Mich.
Dole Valve Co., 1901-41 Carroll Ave., Chicago, Ill.
General Plate Co., 34 Forrest St., Attleboro, Mass.
Wilson Co., H. A., The, 105 Chestnut St., Newark, N. J.

BLADES
For Propeller Fans

Aerovent Fan Co., 710 E. Ash St., Piqua, O.
Air Controls, Inc., 9205 Detroit Ave., Cleveland, O.
Aire-Foile Fan & Blower Co., 4737 W. Vernor Highway, Detroit, Mich.
Airmaster Corp., 4317 Ravenswood Ave., Chicago, Ill.
Air-O-Line Co., The, 1101-1107 McKinney, Dallas, Tex.
Airtherm Mfg. Co., 700 S. Spring Ave., St. Louis, Mo.
Allen Corp., 9767 Erwin Ave., Detroit, Mich.
Autovent Fan & Blower Co., 1811-27 N. Kostner Ave., Chicago, Ill.
Belanger Fan & Blower Co., 1230 18th St., Detroit, Mich.
Bishop & Babcock Mfg. Co., 4901 Hamilton Ave., Cleveland, O.
Browning Mfg. Co., Inc., 1940 Browning Blvd., Maysville, Ky.
Champion Blower & Forge Co., Harrisburg Ave. and Charlotte St., Lancaster, Pa.
Chelsea Fan & Blower Co., 370 W. 15th St., New York, N. Y.
Circulators & Devices Mfg. Corp., 100 Prince St., New York, N. Y.
Dallas Engineering Co., Inc., 1115 Hall, Dallas, Tex.
DeBothezat Ventilating Equipment Div., American Machine & Metals, Inc., East Moline, Ill.
Economy Electric Mfg. Co., 4634 W. 21st Pl., Chicago, Ill.
Electrovent Fan & Mfg. Co., 812 W. Lake St., Chicago, Ill.
General Regulator Corp., 2608 Arthington St., Chicago, Ill.
Governair Corp., 605 W. Main St., Oklahoma City, Okla.
Holtum Mfg. Co., Freeport, Ill.
International Engrg., Inc., 1145 Bolander Ave., Dayton, O.
Janette Mfg. Co., 556 W. Monroe St., Chicago, Ill.
King Ventilating Co., Box 178, Owatonna, Minn.
Lohman, Inc., Wm. J., 62 Ninth Ave., New York, N. Y.
Marathon Electric Mfg. Corp., 131 W. Washington St., Wausau, Wis.
Meier Electric & Machine Co., 3525 E. Washington St., Indianapolis, Ind.
Metal Stamping & Mfg. Co., The, E. 168th St., and Waterloo Rd., Cleveland, O.
Mountain States Equipment Co., 1238 Speer Blvd., Denver, Colo.
Myers Electric Co., 410 Third Ave., Pittsburgh, Pa.
Norwin Co., E. Album St., Freeport, Ill.
Propellair, Inc., 1345 Lagonda Ave., Springfield, O.
Schwitzer-Cummins Co., Fan St., Indianapolis, Ind.
South Bend Air Products Corp., 304 E. Colfax Ave., South Bend, Ind.
Sturtevant Co., B. F., Damon St., Hyde Park, Boston, Mass.
Torrington Mfg. Co., 70 Franklin St., Torrington, Conn.
Trane Co., The, La Crosse, Wis.
Utility Fan Corp., 2528 Santa Fe Ave., Los Angeles, Cal.
Victor Electric Products, Inc., 2950 Robertson Rd., Cincinnati, O.

BLOCKS, PILLOW

Ahlberg Bearing Co., 3011 W. 47th St., Chicago, Ill.
Fafnir Bearing Co., 37 Booth St., New Britain, Conn.
Lau Blower Co., 2001 Home Ave., Dayton, O.
Link-Belt Co., 307 N. Michigan Ave., Chicago, Ill.
Randall Graphite Products Corp., 609 W. Lake St., Chicago, Ill.
SKF Industries, Inc., Front St. & Erie Ave., Philadelphia, Pa.
Schwitzer-Cummins Co., Fan St., Indianapolis, Ind.

BLOWER WHEELS
(See Wheels, Blower)

BLOWER-FILTER UNITS

Airtherm Mfg. Co., 700 S. Spring Ave., St. Louis, Mo.
Allen Co., E. H., 22 Dorrance St., Boston, Mass.
Ames Co., W. R., 150 Hooper St., San Francisco, Cal.
Auburn Burner Co., Auburn, Ind.
Baker Furnace & Cleaner Mfg. Co., 2505 Albion St., Toledo, O.
Berger Bros., Co., 229-237 Arch St., Philadelphia, Pa.
Blower Application Co., 918 N. Fourth St., Milwaukee, Wis.
Brundge Co., 514 N. Park St., Kalamazoo, Mich.
Bryant Corp., C. L., 4610 St. Clair Ave., Cleveland, O.
Buffalo Forge Co., 171 Mortimer St., Buffalo, N. Y.
Century Engineering Corp., 401-431 3rd St., S.E., Cedar Rapids, Ia.
Champion Blower & Forge Co., Harrisburg Ave. and Charlotte St., Lancaster, Pa.
Clarage Fan Co., Porter St., Kalamazoo, Mich.
Day Co., The, 2938 Pillsbury Ave., Minneapolis, Minn.
Davies Air Filter Corp., 390 Fourth Ave., New York, N. Y.
Dowagiac Steel Furnace Co., Beeson St., Dowagiac, Mich.
Furblo Co., Hermansville, Mich.
Garden City Fan Co., 332 S. Michigan Ave., Chicago, Ill.
Gehri Co., 1117 Tacoma Ave., Tacoma, Wash.
Goethel Sheet Metal Works, Alfred, 1912 N. Killian Pl., Milwaukee, Wis.
Goethel Co., Alfred C., 2337 N. 31st St., Milwaukee, Wis.
Grand Rapids Blow Pipe and Dust Arrester Co., 525-28 Monroe Ave., Grand Rapids, Mich.
Green Colonial Furnace Co., 322 S. W. Third St., Des Moines, Ia.
Hall Mfg. Co., Cedar Rapids, Ia.
Industrial Sheet Metal Works, Inc., 628 E. Forest Ave., Detroit, Mich.
Jaden Mfg. Co., F., Golden Rod Products, Hastings, Nebr.
Kirk & Blum, Mfg. Co., 2838-52 Spring Grove Ave., Cincinnati, O.
Maysteel Products, Inc., Horicon St., Mayville, Wis.
Meyer Furnace Co., The, 1300 S. Washington St., Peoria, Ill.
Mountain States Equipment Co., 1238 Speer Blvd., Denver, Colo.
Mueller Furnace Co., L. J., 2005 W. Oklahoma Ave., Milwaukee, Wis.
Northern Blower Co., 6409 Barberton Ave., Cleveland, O.
Olsen Mfg. Co., C. A., The, Elyria, O.
Palmer Mfg. Corp., Phoenix, Ariz.
Patten Co., J. V., 500 De Kalb Ave., Sycamore, Ill.
Puhl & Hepper Mfg. Co., Inc., 6400 W. Florissant Ave., St. Louis, Mo.
R-S Products Corp., 4530 Germantown Ave., Philadelphia, Pa.
Round Oak Co., Dowagiac, Mich.
Rudy Furnace Co., Lock Box 60, Dowagiac, Mich.
Spencer Turbine Co., 484 New Park Ave., Hartford, Conn.
Stokermatic Co., The, 1415 S. State St., Salt Lake City, Utah.
Sturtevant Co., B. F., Damon St., Hyde Park, Boston, Mass.
Trane Co., The, La Crosse, Wis.
U. S. Air Conditioning Corp., 2101 Kennedy St., N. E., Minneapolis, Minn.
Utility Fan Corp., 2528 Santa Fe Ave., Los Angeles, Cal.
Waterman-Waterbury Co., The, 1122 Jackson St., N.E., Minneapolis, Minn.
Western Blower Co., 1800 Airport Way, Seattle, Wash.
Westinghouse Electric & Mfg. Co., Springfield, Mass.
Williamson Heater Co., 337 W. Fifth St., Cincinnati, O.

BLOWERS, PRESSURE

Allen Billmyre Corp., 132 Water St., South Norwalk, Conn.
Allis-Chalmers Mfg. Co., 1126 S. 70th St., Milwaukee, Wis.
American Blower Corp., 6000 Russell St., Detroit, Mich.
Autovent Fan & Blower Co., 1811-27 Kostner Ave., Chicago, Ill.
Bayley Blower Co., 1817 S. 66th St., Milwaukee, Wis.
Beach-Russ Co., 60A Church St., New York, N. Y.
Buffalo Forge Co., 171 Mortimer St., Buffalo, N. Y.
Burdett Mfg. Co., 19 N. Loomis St., Chicago, Ill.
Carling Turbine Blower Co., 25 St. John's Rd., Worcester, Mass.
Champion Blower & Forge Co., Harrisburg Ave. and Charlotte St., Lancaster, Pa.
Clarage Fan Co., Porter St., Kalamazoo, Mich.
DeBothezat Ventilating Equipment Div., American Machine & Metals, Inc., East Moline, Ill.
Eclipse Fuel Engineering Co., 707 S. Main St., Rockford, Ill.
Garden City Fan Co., 332 S. Michigan Ave., Chicago, Ill.
General Blower Co., Inc., 2402 Market St., Philadelphia, Pa.
Green Fuel Economizer Co., Inc., Beacon, N. Y.
Ingersoll-Rand Co., 11 Broadway, New York, N. Y.
Kraissl Co., Inc., The, Terhune and Williams Aves, Hackensack, N. J.
Metal Stamping & Mfg. Co., The, E. 168th St., and Waterloo Rd., Cleveland, O.
Mountain States Equipment Co., 1238 Speer Blvd., Denver, Colo.
Muncie Gear Wks., N. Vine St., Muncie, Ind.
North American Mfg. Co., 2910 E. 75th St., Cleveland, O.
Palmer Mfg. Corp., Phoenix, Ariz.
Reynolds Manufacturing Co., 412 Prospect Ave., N. E., Grand Rapids, Mich.
Roots-Connersville Blower Corp., 16th St. and Columbia Rd., Connersville, Ind.
Spencer Turbine Co., 486 New Park Ave., Hartford, Conn.
Sturtevant Co., B. F., Damon St., Hyde Park, Boston, Mass.
Trimount Rotary Power Co., 398 Whiting Ave., East Dedham, Mass.
Utility Fan Corp., 2528 Santa Fe Ave., Los Angeles, Cal.
Western Blower Co., 1800 Airport Way, Seattle, Wash.
Wing Mfg. Co., L. J., 158 W. 14th St., New York, N. Y.

BLOWERS, VENTILATING
(See Fans, Ventilating)

BOILER ALARMS
Low Water

Bailey, Chas. M., Co., 667 Folsom St., San Francisco, Cal.
Bender-Warrick Corp., 131 Pierce St., Birmingham, Mich.
Brown Instrument Co., 4469 Wayne Ave., Philadelphia, Pa.
Diamond Power Specialty Corp., 10340 Oakland, Detroit, Mich.
General Controls Co., 700 W. Ivy St., Glendale, Cal.
Illinois Engineering Co., 2035 S. Racine Ave., Chicago, Ill.
Johnson Corp., 830 Wood St., Three Rivers, Mich.
Kieley & Mueller, Inc., 40 W. 13th St., New York, N. Y.
Kisco Boiler & Engineering Co., 3732 Chouteau Ave., St. Louis, Mo.
Lunkenheimer Co., Beekman St. & Waverly Ave., Cincinnati, O.
McAlear Mfg. Co., 1901-07 S. Western Ave., Chicago, Ill.
McDonnell & Miller, 400 N. Michigan Ave., Chicago, Ill.
Mercoid Corp., The, 4201 Belmont Ave., Chicago, Ill.
Minneapolis-Honeywell Regulator Co., 2701 Fourth Ave., South, Minneapolis, Minn.
Mueller Steam Specialty Co., Inc., 40-20 22nd St., Long Island City, N. Y.
Preferred Utilities Mfg. Corp., 33 West 60th St., New York, N. Y.
Reliance Gauge Column Co., 5902 Carnegie Ave., Cleveland, O.
Schaub Engineering Co., Fred H., 325 W. Huron St., Chicago, Ill.
Schutte & Koerting Co., 12th & Thompson Sts., Philadelphia, Pa.
Watts Regulator Co., 250 Lowell St., Lawrence, Mass.
Webster & Co., Warren, 17th & Federal Sts., Camden, N. J.
Wright-Austin Co., 315 W. Woodbridge St., Detroit, Mich.
Yarnall-Waring Co., Chestnut Hill, Philadelphia, Pa.

BOILER CUT-OFFS
Low Water

Bender-Warrick Corp., 131 Pierce St., Birmingham, Mich.
Bishop & Babcock Sales Co., 4901-4915 Hamilton Ave., N. E., Cleveland, O.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Eclipse Fuel Engineering Co., 707 S. Main St., Rockford, Ill.
General Controls Co., 1370 Harrison St., San Francisco, Cal.

This MASTER MANUAL
takes the mystery out of V-belt drive selection

In three minutes

. . . . you can determine the correct belt and sheave combination.

No tricky figuring or complicated engineering calculations . . . just simple arithmetic and common sense.

ENTHUSIASTICALLY APPROVED EVERYWHERE

Over 10,000 requested in less than four months.

And a copy is yours for the asking.
Write or use the coupon below. NOW, BEFORE YOU TURN THE PAGE.

WORTHINGTON PUMP AND MACHINERY CORPORATION
Harrison, New Jersey
Send me a copy of the Worthington Multi-V-Drive Master Engineering Manual, V-1400-E2.

*Name*_____ *Position*_____
*Firm*_____
*Address*_____

MVO-1A

Johnson Corp., 830 Wood St., Three Rivers, Mich.
Kisco Boiler & Engineering Co., 3732 Chouteau Ave., St. Louis, Mo.
Maid-O'-Mist, Inc., 215 N. Aberdeen St., Chicago, Ill.
McAlear Mfg. Co., 1901-07 S. Western Ave., Chicago, Ill.
McDonnell & Miller, 400 N. Michigan Ave., Chicago, Ill.
Minneapolis-Honeywell Regulator Co., 2701 Fourth Ave., South, Minneapolis, Minn.
Mueller Steam Specialty Co., Inc., 40-20 22nd St., Long Island City, N. Y.
Preferred Utilities Mfg. Corp., 33 West 60th St., New York, N. Y.
Reliance Gauge Column Co., 5902 Carnegie Ave., Cleveland, O.
Schaub Engineering Co., Fred H., 325 W. Huron St., Chicago, Ill.
Strong, Carlisle & Hammond Co., 1392-1394 W. 3rd St., Cleveland, O.
United Electric Controls Co., 69 A St., Boston, Mass.
Watts Regulator Co., 250 Lowell St., Lawrence, Mass.
Webster & Co., Warren, 17th & Federal Sts., Camden, N. J.
Wright-Austin Co., 315 W. Woodbridge St., Detroit, Mich.

BOILER-BURNER UNITS
For Oil Fuel

Airtemp, Inc., 1119 Leo St., Dayton, O.
American Radiator & Standard Sanitary Corp., Bessemer Bldg., Pittsburgh, Pa.
Anchor Post Fence Co., Fluid Heat Division, Eastern Ave. & Kane St., Baltimore, Md.
Auburn Burner Corp., 411 N. Indiana Ave., Auburn, Ind.
Autocrat Oil Burner Corp., 100 E Ave., N. W., Cedar Rapids, Ia.
Auto-Heat Corp., 311 W. 66th St., New York, N. Y.
Automatic Burner Corp., 1823 Carroll Ave., Chicago, Ill.
Ballard, Inc., Arthur H., 535 Commonwealth Ave., Boston, Mass.
Bass Foundry & Machine Co., 1602-1734 Hanna St., Ft. Wayne, Ind.
Beckett Engineering Co., R. W., Elyria, O.
Bethlehem Foundry & Machine Co., W. Second St., Bethlehem, Pa.
Brownell Co., 300 N. Findlay St., Dayton, O.
Bryan Steam Corp. (or Gas), P. O. Box 337, Peru, Ind.
Bryant Corp., C. L., 4610 St. Clair Ave., N. E., Cleveland, O.
Carrier Corp., 850 Frelinghuysen Ave., Newark, N. J.
Carter-Korth Oil Burner Corp., 123 Hawthorne St., Roselle Park, N. J.
Century Engineering Corp., 215 Fourth Ave., S. E., Cedar Rapids, Ia.
Chalmers Oil Burner Co., 1234 Central Ave., N. E., Minneapolis, Minn.
Cleaver-Brooks Co., 135 W. Wells St., Milwaukee, Wis.
Cleveland Steel Products Corp., Toridheet Div., 7304 Madison Ave., Cleveland, O.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Delco Appliance Div., General Motors Sales Corp., Rochester, N. Y.
Denver Fire Clay Co., 2301 Blake St., Denver, Colo.
Eastern Foundry Co., Spring & Schaeffer Sts., Boyertown, Pa.
Easternoil, Inc., 133 Marginal Way, Portland, Maine.
Eisler Engineering Co., 744-772 S. 13th St., Newark, N. J.
Electrol Incorporated, 934 Main Ave., Clifton, N. J.
Fairfield Oil Heating Co., Inc., Mason St., Greenwich, Conn.
Fluid Heat Division, Anchor Post Fence Co., Eastern Ave. & Kane St., Baltimore, Md.
General Electric Co., Air Conditioning and Commercial Refrigeration Dept., Bloomfield, N. J.
General Oil Burner Corp., 1623 Asquith St., Baltimore, Md.
Gilbert & Barker Mfg. Co., Springfield, Mass.
Godfrey-Keeler Co., Inc., 77 Warren St., New York, N. Y.
Gold Star Oil Burner Mfg. Co., Inc., 146-150 Warburton Ave., Yonkers, N. Y.
Gould Oil Burner Corp., 110 Brookline St., Cambridge, Mass.
Greenwood Engineering Co., Glenarm, Md.
Hardinge Oil Burner Co., 1770 W. Berteau Ave., Chicago, Ill.
Harvey-Whipple, Inc., 55 Emery St., Springfield, Mass.
Heil Co., 3000 W. Montana St., Milwaukee, Wis.
International Heater Co., 101 Park Ave., Utica, N. Y.
Johnson Co., S. T., 940-948 Arlington Ave., Oakland, Cal.
Kaveny Bros. Co., 49 Bloomfield Ave., Newark, N. J.
Kelly Oil Sales Corp., Forest St. Place, Arlington, Mass.
Kelvinator Corp., 14250 Plymouth Rd., Detroit, Mich.
Kisco Boiler & Engineering Co., 3732 Chouteau Ave., St. Louis, Mo.
Kleen-Heet, Inc., 1823 Carroll Ave., Chicago, Ill.
Leahy Mfg. Co., 1804-1810 E. 8th St., Los Angeles, Cal.
Little Burner Co., H. C., 2nd & Lincoln Ave., San Rafael, Cal.
Macrae Inc., 554 Vanderbilt Ave., Brooklyn, N. Y.
May Oil Burner Corp., Maryland Ave. & Oliver St., Baltimore, Md.
Mayflower Oil Burner Corp., 5002 Hudson Blvd., West New York, N. J.
Mettler Co., Lee B., 406 S. Main St., Los Angeles, Cal.
Mueller Furnace Co., L. J., 2005 W. Oklahoma Ave., Milwaukee, Wis.
National Radiator Co., 221 Central Ave., Johnstown, Pa.
Nelson Corporation, The, Herman, Moline, Ill.
Norge Div., Borg-Warner Corp., 670 E. Woodbridge Ave., Detroit, Mich.
Nu-Way Corp., 2416-2420 4th Ave., Rock Island, Ill.
Orr & Sembower, Inc., Reading, Pa.
Pan American Engineering Co., 820 Parker St., Berkeley, Cal.
Penn Boiler & Burner Mfg. Corp., Lancaster, Pa.
Petroleum Heat & Power Co., Southfield Ave., Stamford, Conn.
Pierce, Butler Radiator Corp., 701 Nichols Ave., Syracuse, N. Y.
Porcupine Co., Bridgeport, Conn.
Reif-Rexoil, Inc., 37-43 Carroll St., Buffalo, N. Y.
Scott-Newcomb, Inc., 1922 Pine St., St. Louis, Mo.
Simplex Oil Heating Corp., 30 Church St., New York, N. Y.
Stewart Oil Burner Co., 222 N. Franklin St., Hanover, Pa.
Sullivan Valve & Engineering Co., 910 S. Arizona St., Butte, Mont.
Sundstrand Engineering Co., 1327 7th St., Rockford, Ill.
Timken Silent Automatic Division of Timken-Detroit Axle Co., 100-400 Clark Ave., Detroit, Mich.
Wayne Oil Burner Corp., 102 Glasgow Ave., Ft. Wayne, Ind.
Westinghouse Electric & Mfg. Co., Springfield, Mass.
Williams Oil-O-Matic Heating Corp., 1201 E. Bell St., Bloomington, Ill.
Wisconsin Oil Burner Co., 1134 Regent St., Madison, Wis.
Wood Industries, Inc., Gar, Air Conditioning Division, 7924 Riopelle St., Detroit, Mich.
York Ice Machinery Corp., Roosevelt Ave., York, Pa.
York Oil Burner Co., Inc., P. R. R. & Jessop Pl., York, Pa.

BOILER-BURNER UNITS
Gas-Fired

Airtemp, Inc., 1119 Leo St., Dayton, O.
Almy Water Tube Boiler Co., 184 Allens Ave., Providence, R. I.
American Radiator & Standard Sanitary Corp., Bessemer Bldg., Pittsburgh, Pa.
Ames Iron Works, Division of Pierce, Butler Radiator Corp., Oswego, N. Y.
Bass Foundry & Machine Co., 1602-1734 Hanna St., Ft. Wayne, Ind.
Bastian-Morley Co., Inc., 208-308 Truesdell Ave., La Porte, Ind.
Bros Boiler & Mfg. Co., Wm., Nicollet Island, Minneapolis, Minn.
Brownell Co., 300 N. Findlay St., Dayton, O.
Bryan Steam Corp., P. O. Box 337, Peru, Ind.
Bryant Corp., C. L., 4610 St. Clair Ave., Cleveland, O.
Bryant Heater Co., 17825 St. Clair Ave., Cleveland, O.
Burnham Boiler Corp., Main St., Irvington, N. Y.
Carrier Corp., 850 Frelinghuysen Ave., Newark, N. J.
Cleveland Steel Products Corp., Toridheet Div., Madison at W. 74th St., Cleveland, O.
Cox Mfg. Corp., Abram, 5th St. & Cannon Ave., Lansdale, Pa.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Delco Appliance Co., Rochester, N. Y.
Denver Fire Clay Co., 2301 Blake St., Denver, Colo.
Eastern Foundry Co., Spring & Schaeffer Sts., Boyertown, Pa.
Erie City Iron Works, 1500 East Ave., Erie, Pa.
Fitzgibbons Boiler Co., Inc., 101 Park Ave., New York, N. Y.
General Electric Co., Air Conditioning and Commercial Refrigeration Dept., Bloomfield, N. J.
Johnson Co., S. T., 940-948 Arlington Ave., Oakland, Cal.
Kehm Corp., The, 441 N. La Salle St., 51 E. Grand Ave., Chicago, Ill.
Kisco Boiler & Engineering Co., 3732 Chouteau Ave., St. Louis, Mo.
Mueller Furnace Co., L. J., 2005 W. Oklahoma Ave., Milwaukee, Wis.
National Radiator Co., 221 Central Ave., Johnstown, Pa.
Peerless Heater Co., Div. Eastern Fdry. Co., Boyertown, Pa.
Pennsylvania Furnace & Iron Co., 316 Pine St., Warren, Pa.
Pierce, Butler Radiator Corp., 701 Nichols Ave., Syracuse, N. Y.
Prox Co., Frank, 1201 S. First St., Terre Haute, Ind.
Richmond Radiator Co., Uniontown, Pa.
Roberts-Gordon Appliance Corp., 137 Arthur St., Buffalo, N. Y.
Scott-Newcomb, Inc., 1922 Pine St., St. Louis, Mo.
Sullivan Valve & Engineering Co., 910 S. Arizona St., Butte, Mont.
Titusville Iron Works Co., S. Franklin St., Titusville, Pa.
Troop Water Heater Co., 2516-2526 Jane St., Pittsburgh, Pa.
United States Radiator Corp., 1056 National Bank Bldg., Detroit, Mich.
Utica Radiator Corp., 2201 Dwyer Ave., Utica, N. Y.
Westinghouse Electric & Mfg. Co., Springfield, Mass.
York Ice Machinery Corp., Roosevelt Ave., York, Pa.

BOILER COMPOUNDS
(See Compounds, Boiler)

BOILER FEEDERS
(See Feeders, Boiler)

BOILER-STOKER UNITS

Bros Boiler & Mfg. Co., Wm., Nicollet Island, Minneapolis, Minn.
Delaware, Lackawanna & Western Coal Co., 120 Broadway, New York, N. Y.
Dickson Coal Co., Inc., 17 Battery Pl., New York, N. Y.
Fuel Savers, Inc., 15th & Herr St., Harrisburgh, Pa.
Grindle Fuel Equipment Co., 3222 N. Halsted St., Chicago, Ill.
Kisco Boiler & Engineering Co., 3732 Chouteau Ave., St. Louis, Mo.
Pierce Butler Radiator Corp., 701 Nichols Ave., Syracuse, N. Y.
Stephens-Adamson Mfg. Co., Aurora, Ill.
Stokermatic Co., The, 1415 S. State St., Salt Lake City, Utah.
Whiting Corp., 1536 Halsted St., Harvey, Ill.
Will-Burt Co., N. Main St., Orrville, O.

BOILERS
Cast-Iron Sectional

American Radiator & Standard Sanitary Corp., Bessemer Bldg., Pittsburgh, Pa.
Bryan Steam Corp., P. O. Box 337, Peru, Ind. (Copper tubes)
Bryant Heater Co., The, 17825 St. Clair Ave., Cleveland, O.
Burnham Boiler Corp., Main St., Irvington, N. Y.
Columbia Radiator Co., 3400 Walnut St., McKeesport, Pa.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Eastern Foundry Co., Peerless Heater Div., Boyertown, Pa.
General Oil Burner Corp., 1623 Asquith St., Baltimore, Md.
Hart & Crouse Corp., 301 Turner St., Utica, N. Y.
Herbert Boiler Co., Root & La Salle Sts., Chicago, Ill.
International Heater Co., 101 Park Ave., Utica, N. Y.
Mueller Furnace Co., L. J., 2005 W. Oklahoma Ave., Milwaukee, Wis.
National Radiator Co., 221 Central Ave., Johnstown, Pa.
Peerless Heater Co., Div. Eastern Fdry. Co., Boyertown, Pa.
Pennsylvania Furnace & Iron Co., P. O. Box 269, Warren, Pa.
Pierce, Butler Radiator Corp., 701 Nichols Ave., Syracuse, N. Y.
Porcupine Co., Bridgeport, Conn.
Prox Co., Inc., Frank, 1201 S. First St., Terre Haute, Ind.
Smith Co., Inc., H. B., The, 57 Main St., Westfield, Mass.
Spencer Heater Div., Aviation Mfg. Corp., 164 Park St., Williamsport, Pa.
Thatcher Furnace Co., 39 St. Francis St., Newark, N. J.
United States Radiator Corp., 1056 National Bank Bldg., Detroit, Mich.
Utica Radiator Corp., 2201 Dwyer Ave., Utica, N. Y.
Weil-McLain Co., 641 W. Lake St., Chicago, Ill.
Westinghouse Electric & Mfg. Co., Springfield, Mass.
XXth Century Heating & Ventilating Co., Ira & Edison Ave., Akron, O.
York Ice Machinery Corp., Roosevelt Ave., York, Pa.

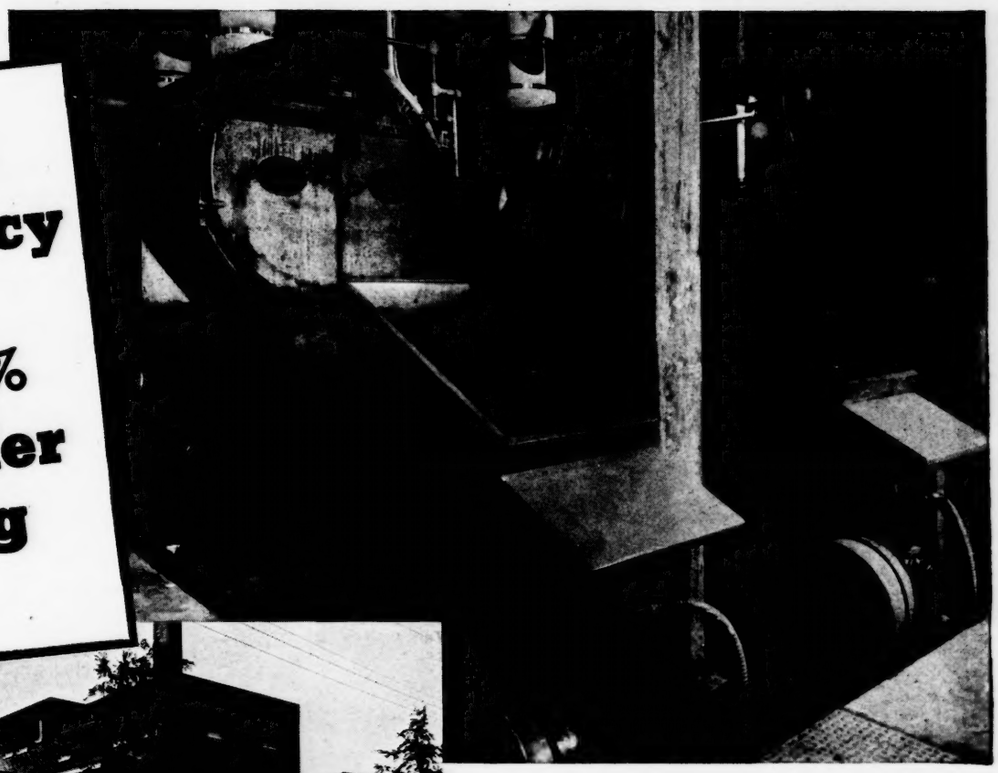
BOILERS
Steel Heating
Fire Tube (F). Water Tube (W)

Ames Iron Wks., Div. of Pierce Butler Radiator Corp., Oswego, N. Y. (F)
Anetsberger Bros., 3505 Elston Ave., Chicago, Ill. (W)
Babcock & Wilcox Co., 85 Liberty St., New York, N. Y. (W)
Bass Foundry & Machine Co., 1602-1734 Hanna St., Ft. Wayne, Ind. (F) (W)
Bigelow Co., The, 92 River St., New Haven, Conn. (F)
Bros Boiler & Mfg. Co., Wm., Nicollet Island, Minneapolis, Minn. (F) (W)
Brownell Co., 300 N. Findlay St., Dayton, O. (F)
Burnham Boiler Corp., Main St., Irvington, N. Y. (F)
Campbell Heating Co., E. K., 2445 Charlotte St., Kansas City, Mo. (W)
Cleaver-Brooks Co., 3112 W. Center St., Milwaukee, Wis. (F)
Combination Boiler Co., P. O. Box 676, Benton Harbor, Mich. (F) (W)
Combustion Engineering Co., Inc., 200 Madison Ave., New York, N. Y. (F) (W)
Dillon Steam Boiler Wks., Inc., D. M., Crocker St., Fitchburg, Mass. (F)

PACIFIC BOILERS

EXCEED U. S. H. A. GOVERNMENT REQUIREMENTS

74.5% Efficiency at 139.5% of boiler rating



Pacific Steel Boilers installed by the C. Wallace Plumbing Company, Nashville, Tennessee, coupled with automatic stokers, deliver unusually high efficiency.

•

United States Housing Authority Project No. H-2102-B-2, designed by Nashville Allied Architects, Nashville, Tennessee, and heated with Pacific Steel Boilers.

UNITED STATES Housing Authority specifications called for 70% boiler and stoker efficiency at 100% boiler rating on this Nashville project. Actual tests by Housing Authority engineers gave Pacific boilers 74.5% efficiency at 139.5% of boiler rating. Unusually high, but not unusual for Pacific boilers. And with this high efficiency the stack temperature of the boiler was only 517°.

The result of this acceptance test is the finest possible proof for private builders. In the Nashville job pictured here, 12 Pacific, High Fire-Box Stoker Boilers, with 100,000 feet of boiler capacity, were installed. Regardless of the size of your job, or whatever type of job — commercial, office building, apartment, housing project — it will pay you to investigate Pacific Steel Boilers. Send for your copy of the latest Pacific catalog.

PACIFIC STEEL BOILERS

DIVISION OF UNITED STATES RADIATOR CORPORATION, DETROIT, MICH.

Eclipse Fuel Engineering Co., 707 S. Main St., Rockford, Ill. (F)
Edge Moor Iron Wks., 30 Rockefeller Plaza, New York, N. Y. (W)
Erie City Iron Wks., 1450 East Ave., Erie, Pa. (F) (W)
Farrar & Trefts, 9 Grimes St., Buffalo, N. Y. (F)
Fitzgibbons Boiler Co., Inc., 101 Park Ave., New York, N. Y. (F)
Fluid Heat Division, Anchor Post Fence Co., Eastern Ave. & Kane St., Baltimore, Md. (W)
Foster Wheeler Corp., 165 Broadway, New York, N. Y. (W)
Frick Co., Waynesboro, Pa. (F)
Frost Mfg. Co., S. Henderson St., Galesburg, Ill. (F)
Gallaher Boiler Co., 3515 LaClede Ave., St. Louis, Mo. (F)
General Furnaces Corp., 17 State St., New York, N. Y. (F)
General Oil Burner Corp., 1623 Asquith St., Baltimore, Md. (F) (W)
Heilman Boiler Works, Allentown, Pa. (F) (W)
Herbert Boiler Co., Root & LaSalle Sts., Chicago, Ill. (F)
Hodge Boiler Wks., Summer St., East Boston, Mass. (F)
International Boiler Wks. Co., The, East Stroudsburg, Pa. (F) (W)
International Engineering Wks., Inc., Box 71 Framingham, Mass. (F) (W)
Johnston Bros., Inc., Ferrysburg, Mich. (F)
Keeler Co., E., 238 West St., Williamsport, Pa. (F)
Kewanee Boiler Corp., Kewanee, Ill. (F)
Kisco Boiler & Engineering Co., 3732 Chouteau Ave., St. Louis, Mo. (F)
Koven & Brother, Inc., L. O., 154 Ogden Ave., Jersey City, N. J. (F) (W)
Leffel & Co., James, The, 426 East St., Springfield, O. (F)
Lookout Boiler & Mfg. Co., Compress St. & Mfrs. Rd., Chattanooga, Tenn. (F)
Manitowoc Boiler Wks., 16th & The River, Manitowoc, Wis. (F)
Mears-Kane-Ofeldt, Inc., 1903-1915 E. Hagert St., Philadelphia, Pa. (F) (W)
Milwaukee Reliance Boiler Wks., 2784 N. 32nd St., Milwaukee, Wis. (F)
Murray Iron Wks. Co., 1106 Washington St., Burlington, Ia. (W)
National Radiator Co., 221 Central Ave., Johnstown, Pa. (F)
Orr & Sembower, Inc., Box 817, Reading, Pa. (W)
Pacific Steel Boiler Div., United States Radiator Corp., 1056 First National Bank Bldg., Detroit, Mich. (F)
Pennsylvania Furnace & Iron Co., P. O. Box 269, Warren, Pa.
Pierce, Butler Radiator Corp., 701 Nichols Ave., Syracuse, N. Y. (F)
Porcupine Co., Bridgeport, Conn. (F)
Riley Stoker Corp., 9 Neponset St., Worcester, Mass. (W)
Sioux City Foundry & Boiler Co., E. 8th & Division Sts., Sioux City, Ia.
Smith Twin Tubular Boiler Co., Inc., Cottman St., at State Rd., Philadelphia, Pa. (F) (W)
Spencer Heater Div., Aviation Mfg. Corp., 164 Park St., Williamsport, Pa. (F)
Springfield Boiler Co., 1901 E. Capital Ave., Springfield, Ill. (W)
Titusville Boiler Div., The, Struthers - Wells - Titusville Corp., Titusville, Pa. (F) (W)
Union Iron Works, 1500 Cascade St., Erie, Pa. (F) (W)
Vapor Car Heating Co., Inc., 80 E. Jackson Blvd., Chicago, Ill. (W)
Vogt Machine Co., Henry, 10th & Ormsby Sts., Louisville, Ky. (W)
Vortex Mfg. Co., 687 N. Tillamook St., Portland, Ore. (F)
Waterfilm Boilers, Inc., 154 Ogden Ave., Jersey City, N. J. (F) (W)
Wickes Boiler Co., 502 N. Water St., Saginaw, Mich. (F) (W)

BOMBS, SMOKE
For Tracing Air Movements

Hill, E. Vernon, 6826 W. Highland Ave., Chicago, Ill.
Newman Co., Inc., I. C., 6 E. 45th St., New York, N. Y.
Pains Fireworks Display Co., 22 Park Pl., New York, N. Y.
Preferred Utilities Mfg. Corp., 33 N. 60th St., New York, N. Y.

BRASS PIPE

(See Pipe, Brass and Copper)

BRASS TUBING

(See Tubing, Brass and Copper)

BURNERS, GAS

Auburn Burner Co., Auburn, Ind.
Autogas Co., 2258 Diversey Ave., Chicago, Ill.
Babcock & Wilcox Co., 85 Liberty St., New York, N. Y.
Barber Gas Burner Co., 3704 Superior Ave., Cleveland, O.
Bastian-Morley Co., Inc., 208-308 Truesdell Ave., La Porte, Ind.
Bryan Steam Corp., P. O. Box 337, Peru, Ind.
Bryant Corp., C. L., 4610 St. Clair Ave., Cleveland, O.
Bryant Heater Co., The, 17825 St. Clair Ave., Cleveland, O.
Burdett Mfg. Co., 19 N. Sheldon St., Chicago, Ill.
Campbell Heating Co., E. K., 2445 Charlotte St., Kansas City, Mo.
Continental Stove Corp., Front & Walnut, Ironton, O.
Coppus Engineering Corp., 344 Park Ave., Worcester, Mass.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Denver Fire Clay Co., 2301 Blake St., Denver, Colo.
Dowagiac Steel Furnace Co., Beeson St., Dowagiac, Mich.
Eclipse Fuel Engrg. Co., 707 S. Main St., Rockford, Ill.
Electro Gas Co., 2575 Bay Shore Blvd., San Francisco, Cal.
Engineer Co., 17 Battery Pl., New York, N. Y.
Enterprise Oil Burner Co., 2949 18th St., San Francisco, Cal.
Franklin Gas Heating Co., 1232 Vine St., Cincinnati, O.
Handley-Brown Heater Co., Jackson, Mich.
Hugo Mfg. Co., 49th Ave., W. & Superior St., Duluth, Minn.
Johnson Gas Appliance Co., 520 "E" Ave., N. W., Cedar Rapids, Ia.
Lammert & Mann Co., 221 N. Wood St., Chicago, Ill.
Leahy Mfg. Co., 1804 E. 8th St., Los Angeles, Cal.
Lennox Furnace Co., Inc., Syracuse N. Y., & Marshalltown, Ia.
Martin, J. O. & C. U., 647 Minna St., San Francisco, Cal.
Mears-Kane-Ofeldt, Inc., 1903-1915 E. Hagert St., Philadelphia, Pa.
Mettler Co., Lee B., 406 S. Main St., Los Angeles, Cal.
Natural Gas Equipment Incorporated, 539 Petroleum Securities Bldg., Los Angeles, Cal.
National Machine Wks., 1559 N. Sheffield Ave., Chicago, Ill.
North American Mfg. Co., 2910 E. 75th St., Cleveland, O.
Palmer Mfg. Corp., Phoenix, Ariz.
Payne Furnace & Supply Co., Inc., 336-338 N. Foothill Rd., Beverly Hills, Cal.
Peabody Engrg. Corp., 580 Fifth Ave., New York, N. Y.
R-S Products Corp., Germantown Ave., at Wayne Junction, Philadelphia, Pa.
Ray Oil Burner Co., 401-499 Bernal Ave., San Francisco, Cal.
Reznor Mfg. Co., Mercer, Pa.
Roberts - Gordon Appliance Corp., 137 Arthur St., Buffalo, N. Y.
Rotary Mfg. Co., 5718 Long Beach Ave., Los Angeles, Cal.
Schutte & Koerting Co., 12th and Thompson Sts., Philadelphia, Pa.
Selas Co., The, 18th St. at Indiana Ave., Philadelphia, Pa.
Standard Heating & Radiator Co., 704 Second Ave., Pittsburgh, Pa.
Staples & Pfeiffer, Ltd., 528 Bryant St., San Francisco, Cal.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.
Webster Engineering Co., 419 W. 2nd St., Tulsa, Okla.
Williams, Inc., F. C., 22667 Michigan Ave., Dearborn, Mich.
Zink Co., John, 4401 S. Peoria St., Tulsa, Okla.

BURNERS, OIL

Ace Engineering Co., 1735 W. 31st St., Chicago, Ill.
Airtemp Division, Chrysler Corp., Leo St., Dayton, O.
Aldrich Co., Wyoming, Ill.
Arcweld Mfg. Co., Inc., 3469 Third Ave., W., Seattle, Wash.
Auburn Burner Co., Auburn, Ind.
Autocrat Oil Burner Corp., 100 East Ave., N. W., Cedar Rapids, Ia.
Automatic Burner Corp., 1823 Carroll Ave., Chicago, Ill.
Babcock & Wilcox Co., 85 Liberty St., New York, N. Y.
Beckett Engineering Co., R. W., Elyria, O.
Bennett Co., 1109 Harney St., Omaha, Nebr.
Berryman Oil Burner Co., 1304 Washington Blvd., Chicago, Ill.
Bethlehem Foundry & Machine Co., Brodhead Ave. & Second St., Bethlehem, Pa.
Braden Engineering, Inc., 896 Elmwood Ave., Providence, R. I.
Bryan Steam Corp., P. O. Box 337, Peru, Ind.
Burnham Boiler Corp., Main St., Irvington, N. Y.
Calesco Corporation, 300 Broad St., Lynn, Mass.
Caloroil Burner Corp., 1477 Park St., Hartford, Conn.
Campbell Machine Co., 2845 Harriet Ave., Minneapolis, Minn.
Carrier Corp., 302 S. Geddes St., Syracuse, N. Y.
N. D. Cashin Co., 69 A Street, Boston, Mass.
Century Engrg. Corp., 401-431 3rd St., S. E., Cedar Rapids, Ia.
Chalmers Oil Burner Co., 1234 Central Ave., Minneapolis, Minn.
Chandler Co., 804 First Ave., N. W., Cedar Rapids, Ia.
Cleaver-Brooks Co., 3112 W. Center St., Milwaukee, Wis.
Cleveland Steel Products, Corp., Toridheet Div., Madison at W. 74th St., Cleveland, O.
Conco Corporation, Mendota, Ill.
Connery Construction Co., Inc., 2nd and Luzerne Sts., Philadelphia, Pa.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Delco Appliance Div., General Motors Sales Corp., Rochester, N. Y.
Denver Fire Clay Co., 2301 Blake St., Denver, Colo.
Dowagiac Steel Furnace Co., Beeson St., Dowagiac, Mich.
Easternoil, Inc., 133 Marginal Way, Portland, Me.
Electrol, Inc., 934 Main St., Clifton, N. J.
Engineer Co., 17 Battery Pl., New York, N. Y.
Enterprise Oil Burner Co., 2949 18th St., San Francisco, Cal.
Excelsior Steel Furnace Co., The, 118 S. Clinton St., Chicago, Ill.
Fairfield Oil Heating Co., Inc., Mason St., Greenwich, Conn.
Fluid Heat Division, Anchor Post Fence Co., Eastern Ave. & Kane St., Baltimore, Md.
General Electric Co., Air Cond. Div., 5 Lawrence St., Bloomfield, N. J.
General Oil Burner Corp., 1623 Asquith St., Baltimore, Md.
General Oil Heating Corp., 528 Jefferson St., West New York, N. J.
Gilbert & Barker Mfg. Co., Springfield, Mass.
Green Colonial Furnace Co., 322 S. W. Third St., Des Moines, Ia.
Hall-Neal Furnace Co., 1324 N. Capitol Ave., Indianapolis, Ind.
Hardinge Oil Burner Co., 1770 Berteau St. at Ravenswood, Chicago, Ill.
Hart Oil Burner Corp., 2200 N. Adams St., Peoria, Ill.
Harvey-Whipple, Inc., 55 Emery St., Springfield, Mass.
Heil Co., 3000 W. Montana St., Milwaukee, Wis.
Herco Oil Burner Corp., 109 Chestnut St., Lancaster, Pa.
Hess Warming and Ventilating Co., 1221-1227 S. Western Ave., Chicago, Ill.
Holtum Mfg. Co., Freeport, Ill.
Hubbard Co., 1014 Marquette Ave., Minneapolis, Minn.
Jacobsen Mfg. Co., Washington at 8th, Racine, Wis.
Johnson Co., S. T., 940 Arlington Ave., Oakland, Cal.
Johnston Mfg. Co., 2825 E. Hennepin Ave., Minneapolis, Minn.
Kelvinator Div., Nash-Kelvinator Corp., 14250 Plymouth Rd., Detroit, Mich.
Kleen-Heet, Inc., 1823 Carroll Ave., Chicago, Ill.
Korth Oil Burner Corp., 123 Hawthorne St., Roselle Park, N. J.
Lammert & Mann Co., 221 N. Wood St., Chicago, Ill.
Leahy Mfg. Co., 1804 E. 8th St., Los Angeles, Cal.
Lennox Furnace Co., Inc., Syracuse, N. Y., & Marshalltown, Ia.
Littleford Bros., 257 E. Pearl St., Cincinnati, O.
Macrae, Inc., 554 Vanderbilt Ave., Brooklyn, N. Y.
Majestic Co., 733 Erie St., Huntington, Ind.
Malleable Iron Fittings Co., Banford, Conn.
May Oil Burner Corp., Maryland Ave., & Oliver St., Baltimore, Md.
Mayflower Oil Burner Corp., 5002 Hudson Blvd., West New York, N. J.
Mettler Co., Lee B., 406 S. Main St., Los Angeles, Cal.
Meyer Furnace Co., The, 1300 S. Washington St., Peoria, Ill.
Micro - Westco, Inc., Bettendorf Office Bldg., Bettendorf, Ia.
Milwaukee Reliance Boiler Wks., 2784 N. 32nd St., Milwaukee, Wis.
Monarch Mfg. Works, Inc., Salmon & Westmoreland Sts., Philadelphia, Pa.
Mueller Furnace Co., L. J., 2005 W. Oklahoma Ave., Milwaukee, Wis.
National Airoil Burner Co., Inc., 1284 E. Sedgley Ave., Philadelphia, Pa.
Natural Gas Equipment Incorporated, 539 Petroleum Bldg., Los Angeles, Cal.
Nelson Corporation, The, Herman, Moline, Ill.
Norge Div., Borg-Warner Corp., 670 E. Woodbridge St., Detroit, Mich.
North American Mfg. Co., 2910 E. 75th, Cleveland, O.
Nu-Way Corp., 2416 - 4th Ave., Rock Island, Ill.
Olsen Mfg. Co., C. A., The, Elyria, O.
Pan American Engineering Co., 820 Parker St., Berkeley, Cal.
Paragon Oil Burner Corp., 75 Bridgewater St., Brooklyn, N. Y.
Peabody Engrg. Corp., 580 Fifth Ave., New York, N. Y.
Penn Boiler & Burner Mfg. Corp., 359 N. Market St., Lancaster, Pa.
Petroleum Heat & Power Co., 110 Davenport St., Stamford, Conn.
Pierce Butler Radiator Corp., 701 Nichols Ave., Syracuse, N. Y.
Preferred Utilities Manufacturing Corp., 33 W. 60th St., New York, N. Y.
Quiet Heet Burner Co., 1555 Coney Island Ave., Brooklyn, N. Y.
R-S Products Corp., 4530 Germantown Ave., Philadelphia, Pa.
Ray Oil Burner Co., 401-499 Bernal Ave., San Francisco, Cal.
Reif-Rexoil, Inc., 37 Carroll St., Buffalo, N. Y.
Riley Stoker Corp., 9 Neponset St., Worcester, Mass.
Rotary Mfg. Co., 5718 Long Beach Ave., Los Angeles, Cal.
Round Oak Co., Dowagiac, Mich.
Rudy Furnace Co., Dowagiac, Mich.
Schutte & Koerting Co., 12th and Thompson Sts., Philadelphia, Pa.
Scott-Newcomb, Inc., 1922 Pine St., St. Louis, Mo.
Silent Glow Oil Burner Corp., 1477 Park St., Hartford, Conn.
Simplex Oil Heating Corp., 21 West St., New York, N. Y.

Skinner Co., E. W., 402 Pearl St., Fitchburg, Mass.
Staples & Pfeiffer, Ltd., 528 Bryant St., San Francisco, Cal.
Sundstrand Engineering Co., 1327 Seventh St., Rockford, Ill.
Sun-Ray Oil Burner Corp., 114-02 Beach Channel Dr., Rockaway Park, N. Y.
Timken Silent Automatic Div., Timken Detroit Axle Co., 100 Clark Ave., Detroit, Mich.
Todd Combustion Equipment, Inc., Ft. of 23rd St., 601 W. 26th St., New York, N. Y.
United States Burner Corp., River Rd., Wethersfield, Conn.
Valley Mfg. Co., Fryeville, Athol, Mass.
Viking Mfg. Co., 12600 Greenfield Rd., Detroit, Mich.
Vortex Mfg. Co., 687 N. Tillamook St., Portland, Ore.
Waterman-Waterbury Co., The, 1122 Jackson St., N. E., Minneapolis, Minn.
Wayne Oil Burner Corp., 800 Glasgow Ave., Fort Wayne, Ind.
Webster Engineering Co., 419 W. 2nd St., Tulsa, Okla.
Westinghouse Electric & Mfg. Co., Springfield, Mass.
Williams Oil-O-Matic Heating Corp., 1201 E. Bell, Bloomington, Ill.
Wood Industries, Inc., Gar, 7924 Riopelle St., Detroit, Mich.
Woolery Machine Co., 2919 Como Ave., S. E., Minneapolis, Minn.
York Ice Machinery Corp., Roosevelt Ave., York, Pa.
York Oil Burner Co., Inc., Jessop Pl., & P.R.R., York, Pa.
Zink Co., John, 4401 S. Peoria St., Tulsa, Okla.

CAST IRON BOILERS

(See Boilers, Cast-Iron Sectional)

CAST IRON RADIATORS

(See Radiators, Cast Iron)

CAST IRON INDIRECT HEATING SURFACE

(See Surface, Heating, Indirect, Iron and Steel)

CAULKING COMPOUNDS

(See Compounds, Caulking)

CEILING PLATES

(See Plates, Floor and Ceiling)

CEMENT, INSULATING

Acme Asbestos Covering & Flooring Co., 218 N. Elizabeth St., Chicago, Ill.
Atlas Asbestos Co., Ltd., 110 McGill St., Montreal, Que., Canada.
Baldwin-Hill Co., 527 Klagg Ave., Trenton, N. J.
Carey Co., The, Philip, Wayne Ave., Lockland, Cincinnati, O.
Chicago Fire Brick Co., 1467 N. Elston Ave., Chicago, Ill.
Clinton Metallic Paint Co., P. O. Box 278, Clinton, N. Y.
Colebrook & Sons, Inc., W. H., 246 Walton St., Syracuse, N. Y.
Eagle-Picher Lead Co., Temple Bar Bldg., Cincinnati, O.
Ehret Magnesia Mfg. Co., Valley Forge, Pa.
General Insulating & Mfg. Co., 705 Olive St., St. Louis, Mo.
International Vermiculite Co., 11th & Stanford Ave., Springfield, Ill.
Johns-Manville, 22 E. 40th St., New York, N. Y.
Keasbey Co., Robert A., 139-149 W. 19th St., New York, N. C.
Krehbiel, J. H., 425 N. Crawford Ave., Chicago, Ill.
McLeod & Henry Co., Troy, N. Y.
Mexico Refractories Co., Mexico, Mo.
Minfelt Insulation Co., The, 2288 Albion St., Toledo, O.
Munn & Steele, Inc., 130 Lister Ave., Newark, N. J.
National Engineering Products Inc., Commerce & Savings Bldg., Washington, D. C.
Norristown Magnesia & Asbestos Co., Washington St., Norristown, Pa.
Owens-Corning Fiberglas Corp., Nicholas Bldg., Toledo, O.
Pecora Paint Co., 4th & Penna. R.R., Philadelphia, Pa.
Pilbrico Jointless Firebrick Co., 1800 Kingsbury St., Chicago, Ill.
Preferred Utilities Mfg. Corp., 33 W. 60th St., New York, N. Y.
Pyrolite Products Co., 1221-31 W. 74th St., Cleveland, O.
Quigley Co., Inc., 56 W. 45th St., New York, N. Y.
Ramtite Co., The, 2563 W. 18th St., Chicago, Ill.
Refractory & Insulation Corp., 381 Fourth Ave., New York, N. Y.
Ruberoid Co., 500 Fifth Ave., New York, N. Y.
Sall Mountain Co., 176 W. Adams St., Chicago, Ill.
Schundler & Co., Inc., F. E., 4515 Vernon Blvd., Long Island City, N. Y.
Smith & Kanzler, Inc., 516-534 Lidgerwood Ave., Elizabeth, N. J.
Standard Asbestos Mfg. Co., 820-822 W. Lake St., Chicago, Ill.
Standard Fuel Engineering Co., Detroit, Mich.
Standard Lime & Stone Co., 2004 First National Bank Bldg., Baltimore, Md.
Therminsul Corp., 1603 Fulford St., Kalamazoo, Mich.
United States Gypsum Co., 300 W. Adams St., Chicago, Ill.
United States Mineral Wool Co., 9 S. Clinton St., Chicago, Ill.
Universal Zonolite Insulation Co., 4110 Field Bldg., Chicago, Ill.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
Wilson, Inc., Grant, 4115 W. Taylor St., Chicago, Ill.

CEMENT, REFRACTORY

Acme Brick Co., 310 N. P. Anderson Bldg., Ft. Worth, Tex.
Atlas Asbestos Co., Ltd., 110 McGill St., Montreal, Que., Canada.
Babcock & Wilcox Co., 85 Liberty St., New York, N. Y.
Bernitz Furnace Appliance Co., 89 Broad St., Boston, Mass.
Botfield Refractories Co., 776-82 S. Swanson St., Philadelphia, Pa.
Carborundum Co., Dept. P, Perth Amboy, N. J.
Carolina Refractories Co., Hartsville, S. C.
Chicago Fire Brick Co., 1463 Elston Ave., Chicago, Ill.
Dee Material Co., Wm. E., 105 W. Monroe St., Chicago, Ill.
Denver Fire Clay Co., 2301 Blake St., Denver, Colo.
Drake Non-Clinkering Furnace Block Co., Beekman St., New York, N. Y.
Faulkner, J. A. Refractories Co., Youngstown, O.
General Refractories Co., 1600 Real Estate Trust Bldg., Philadelphia, Pa.
Green, A. P., Fire Brick Co., 1020 Breckenridge, Mexico, Mo.
Harbison-Walker Refractories Co., Pittsburgh, Pa.
Johns-Manville, 22 E. 40th St., New York, N. Y.
Keystone Refractories Co., 120 Liberty St., New York, N. Y.
Krehbiel, J. H., 425 N. Crawford Ave., Chicago, Ill.
Laclede-Christy Clay Products Co., 411 N. 7th St., St. Louis, Mo.
McLeod & Henry Co., Inc., Troy, N. Y.
Mexico Refractories Co., Mexico, Mo.
Munn & Steele, Inc., 130 Lister Ave., Newark, N. J.
National Engrg. Products Co., Commerce & Savings Bldg., Washington, D. C.
Norton Co., Worcester, Mass.
Pilbrico Jointless Firebrick Co., 1800 Kingsbury St., Chicago, Ill.
Preferred Utilities Mfg. Corp., 33 W. 60th St., New York, N. Y.
Pyro Clay Products Co., Oak Hill, O.
Quigley Co., Inc., 56 W. 45th St., New York, N. Y.
Ramtite Co., 2563 W. 18th St., Chicago, Ill.
Refractory & Insulation Corp., 381 Fourth Ave., New York, N. Y.
Ruberoid Co., 500 Fifth Ave., New York, N. Y.
Seaboard Refractories Co., Perth Amboy, N. J.
Smith, Sanford C., Refractories Co., 1715 Niagara St., Buffalo, N. Y.
Standard Fuel Engineering Co., 667 Post Ave., South, Detroit, Mich.
U. S. Stoneware Co., 62 E. 42nd St., New York, N. Y.
Walsh Refractories Corp., 4430 N. First St., St. Louis, Mo.

CENTRIFUGAL PUMPS

(See Pumps)

CIRCULATORS
For Hot Water Heating Systems

(See also Pumps, Centrifugal)

American-Marsh Pumps, Inc., 100 Capital Ave., N. E., Battle Creek, Mich.
Bell & Gossett Co., 3000 Wallace St., Chicago, Ill.
Chicago Pump Co., 2325 Wolfram St., Chicago, Ill.
Columbus Steam Pump Works Co., 724 W. Gay St., Columbus, O.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
De Laval Steam Turbine Co., 300 Nottingham Way, Trenton, N. J.
Economy Pumps, Inc., 2522 W. Congress St., Chicago, Ill.
Everite Pump & Mfg. Co., Inc., Lancaster, Pa.
Frederick Iron & Steel Co., E. 7th St., Frederick, Md.
General Blower Co., Inc., 2402 Market St., Philadelphia, Pa.
Hoffman Specialty Co., Inc., Waterbury Natl. Bank Bldg., Waterbury, Conn.
Hotstream Heater Co., The, 8007 Grand Ave., Cleveland, O.
Kainer & Co., 761 W. Lexington, Chicago, Ill.
Kehm Corp., The, 441 N. La Salle St.—51 E. Grand Ave., Chicago, Ill.
Minneapolis-Honeywell Regulator Co., 2701 Fourth Ave., South, Minneapolis, Minn.
Oberdorfer Brass Co., M. L., 2307 Thompson Rd., Syracuse, N. Y.
Penberthy Injector Co., 1242 Holden Ave., Detroit, Mich.
Sterling, Inc., 3738 N. Holton St., Milwaukee, Wis.
Taco Heaters, Inc., 342 Madison Ave., New York, N. Y.
Thrush & Co., H. A., Peru, Ind.
Trane Co., The, La Crosse, Wis.
Triplex Heating Specialty Co., Inc., 131 E. Canal St., Peru, Ind.
Triplex Mfg. Co., Peru, Ind.
Watts Regulator Co., 10 Embankment St., Lawrence, Mass.
Weil Pump Co., 215-17 W. Superior St., Chicago, Ill.
White Flo-Matic Corp., 30 Elm St., Hoosick Falls, N. Y.
Worthington Pump & Machinery Corp., Harrison, N. J.

CLAMPS, BEAM
For Hanging Pipe

Beaton & Cadwell Mfg. Co., 185 Main St., New Britain, Conn.
Carpenter & Paterson, Inc., 1190 Bennington St., East Boston, Mass.
Chicago Nipple Mfg. Co., 1966 Southport Ave., Chicago, Ill.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Crawford Co., 3220 W. 31st St., Chicago, Ill.
Farley Sleeve & Hanger Co., 3748 E. 71st St., Cleveland, O.
Fee & Mason Mfg. Co., Inc., 81 Beekman St., New York, N. Y.
Globe Machine & Stamping Co., 1250 W. 76th St., Cleveland, O.
Grabler Mfg. Co., 6565 Broadway, Cleveland, O.
Grinnell Co., Inc., 260 W. Exchange, Providence, R. I.
Jarecki Mfg. Co., 1345 W. 12th St., Erie, Pa.
Limbert & Co., Geo. B., 570 Fulton St., Chicago, Ill.
National Valve & Mfg. Co., 3101 Liberty Ave., Pittsburgh, Pa.
Pittsburgh Valve & Fittings Corp., Barberton, O.
Rockwood Sprinkler Co., 38 Harlow St., Worcester, Mass.
Southbridge Roofing Co., Inc., Hartwell and Chapin Sts., Southbridge, Mass.
Walworth Co., 60 E. 42nd St., New York, N. Y.

CLAMPS
For Welding Pipe

Jewel Mfg. Co., 1874 Highland Parkway, St. Paul, Minn.
Smooth-On Mfg. Co., 568-574 Communipaw Ave., Jersey City, N. J.

COAL STOKERS

(See Stokers, Coal)

COILS, NON-FERROUS

(See Surface, Air Cooling and Surface, Heating, Indirect)

COLD ACCUMULATORS

(See Accumulators, Cold)

COLLECTORS, DUST

Airtherm Mfg. Co., 700 S. Spring Ave., St. Louis, Mo.
Allen Billmyre Corp., 132 Water St., South Norwalk, Conn.
Allen-Sherman-Hoff Co., Lewis Tower Bldg., Philadelphia, Pa.
Allen, E. H. Co., 22 Dorrance St., Boston, Mass.
Allis-Chalmers Mfg. Co., 1126 S. 70th St., Milwaukee, Wis.
American Air Filter Co., Inc., 107 Central Ave., Louisville, Ky.
American Blower Corp., 6000 Russell St., Detroit, Mich.
American Foundry Equipment Co., 618 Byrkit St., Mishawaka, Ind.
Baker Perkins Co., Inc., Saginaw, Mich.
Barnard & Leas Mfg. Co., Moline, Ill.
Bartlett & Snow Co., C. O., The, 6450 Harvard Ave., Cleveland, O.
Bayley Blower Co., 1817 S. 66th St., Milwaukee, Wis.
Belanger Fan & Blower Co., 1230 18th St., Detroit, Mich.
Blower Application Co., 918 N. Fourth St., Milwaukee, Wis.
Brady Conveyors Corp., 20 W. Jackson Blvd., Chicago, Ill.
Bubar, Hudson H., 15 Park Row, New York, N. Y.
Buell Engrg. Co., Inc., 70 Pine St., New York, N. Y.
Buffalo Forge Co., 171 Mortimer St., Buffalo, N. Y.
By-Products Recoveries, Inc., 90 West St., New York, N. Y.
Clark Dust Control Co., 210 N. Mozart St., Chicago, Ill.
Day Co., The, 2938 Pillsbury Ave., Minneapolis, Minn.
Diamond Power Specialtyy Corp., Box 288, Detroit, Mich.
Dixie Mfg. Co., Inc., Russell St., & B. & O. R. R., Baltimore, Md.
Dracco Corp., 4057 E. 116th St., Cleveland, O.
Falstrom Co., Main Ave., D. L. & W. R. R., Passaic, N. J.
Federal Pneumatic Systems, Inc., 127 N. Dearborn St., Chicago, Ill.
Garden City Fan Co., 332 S. Michigan Ave., Chicago, Ill.
Goethel Co., Alfred C., 2337 N. 31st Street, Milwaukee, Wis.
Goethel Sheet Metal Wks., Alfred, 1910 N. Killian Pl., Milwaukee, Wis.
Grand Rapids Blow Pipe & Dust Arrester Co., 525-28 Monroe Ave., Grand Rapids, Mich.
Green Fuel Economizer Co., Inc., Beacon, N. Y.

Holly Pneumatic Systems, Inc., 15 E. 40th St., New York, N. Y.
Industrial Sheet Metal Wks., Inc., 628 E. Forest Ave., Detroit, Mich.
Jacobs Co., B. & J., 1729 John St., Cincinnati, O.
Kirk & Blum Mfg. Co., 2838-52 Spring Grove Ave., Cincinnati, O.
Martin Metal Mfg. Co., 900 E. Second St., Wichita, Kan.
Meadon's Blower & Pipe Works, Inc., 23 Meserole Ave., Brooklyn, N. Y.
Mott Sand Blast Mfg. Co., 4611-4621 W. Flournoy St., Chicago, Ill.
New York Blower Co., 3155 Shields Ave., Chicago, Ill.
Northern Blower Co., 6409 Barberton Ave., Cleveland, O.
Pangborn Corp., Pangborn Blvd., Hagerstown, Md.
Peabody Engrg. Corp., 580 Fifth Ave., New York, N. Y.
Prat-Daniel Corp., Port Chester, N. Y.
Puhl & Hepper Mfg. Co., Inc., 6400 W. Florissant Ave., St. Louis, Mo.
Research Corp., Chrysler Bldg., New York, N. Y.
Richmond Engrg. Co., Inc., P. O. Box 514, Richmond, Va.
Robinson Mfg. Co., Muncy, Pa.
Ruemelin Mfg. Co., 3920 N. Palmer St., Milwaukee, Wis.
St. Louis Blow Pipe & Heater Co., 1954 N. 9th St., St. Louis, Mo.
Schneible Co., Claude B., 3951 Lawrence Ave., Chicago, Ill.
Skinner Heating & Ventilating Co., Inc., 9th & Chambers St., St. Louis, Mo.
Sly Mfg. Co., W. W., 4700 Train Ave., Cleveland, O.
Spencer Turbine Co., 486 New Park Ave., Hartford, Conn.
Sprout, Waldron & Co., Muncy, Pa.
Steamaire Co., Cincinnati, O.
Sterling Blower Co., Hartford, Conn.
Strandwitz & Co., Inc., W. J., Jefferson and Master Sts., Camden, N. J.
Sturtevant Co., B. F., Damon St., Hyde Park, Boston, Mass.
Sturtevant Mill Co., Park & Clayton Sts., Dorchester, Boston, Mass.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia, Pa.
Treadwell Construction Co., Midland, Pa.
Western Blower Co., 1800 Airport Way, Seattle, Wash.
Western Precipitation Corp., 1016 W. 9th St., Los Angeles, Cal.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
Whiting Corp., 15627 Lathrop Ave., Harvey, Ill.
Young & Bertke Co., 1004-1014 Hulbert Ave., Cincinnati, O.

COMPOUNDS
Boiler

Acme Refining Co., The, W. 56th & W. & L. E. Ry., Cleveland, O.
Allis-Chalmers Mfg. Co., 1126 S. 70th St., Milwaukee, Wis.
American Teksag Products Co., Inc., 395 N. MacQuesten Pkwy., Mt. Vernon, N. Y.
Aquatic Chemical Laboratories, Inc., 118 E. 28th St., New York, N. Y.
Atlas Asbestos Co., Ltd., 110 McGill St., Montreal, Que., Canada.
Blue Seal Chemical Co., 177 Westfield Ave., W., Roselle Park, N. J.
Chicago Specialty Mfg. Co., 332 N. Western Ave., Chicago, Ill.
Continental Products Co., 1150 E. 222nd St., Euclid, O.
Dearborn Chemical Co., 310 S. Michigan Ave., Chicago, Ill.
Dissolene Corp., Hempstead, N. Y.
Ferro-Nil Corp., 373 Fourth Ave., New York, N. Y.
General Scientific Equipment Co., 2735 N. Broad St., Philadelphia, Pa.
Grief, Edward C., 64 West End Ave., New York, N. Y.
Haering & Co., Inc., D. W., 2308 S. Winchester Ave., Chicago, Ill.
Hall Laboratories, Inc., 600 Bowman Bldg., Pittsburgh, Pa.
Hercules Chemical Co., Inc., 332 Canal St., New York, N. Y.
Kewanee Boiler Corp., Kewanee, Ill.
Kisco Boiler & Engineering Co., 3732 Chouteau Ave., St. Louis, Mo.
Krehbiel, J. H., 425 N. Crawford Ave., Chicago, Ill.
Metropolitan Refining Co., Inc., 50-23 23rd St., Long Island City, N. Y.
Mouat Vapor Heating Co., The, 1246-1254 W. 4th St., Cleveland, O.
Munn & Steele, Inc., 130 Lister Ave., Newark, N. J.
National Aluminate Corp., 6621 W. 66th Pl., Chicago, Ill.
Oakite Products, Inc., 22 Thames St., New York, N. Y.
Preferred Utilities Mfg. Corp., 33 W. 60th St., New York, N. Y.
Radiator Specialty Co., Charlotte, N. C.
Star Products Co., 130 Walnut Ave., New York, N. Y.
Vinco Co., Inc., The, 305 E. 45th St., New York, N. Y.
Wilhelm Co., A., 3rd and Bern Sts., Reading, Pa.
X Laboratories, Inc., 25 W. 45th St., New York, N. Y.

COMPOUNDS
Boiler and Radiator Sealing

Atlas Asbestos Co., Ltd., 110 McGill St., Montreal, Que., Canada.
Atlas Chemical Co., Marietta, O.
Blue Seal Chemical Co., 177 Westfield Ave., W., Roselle Park, N. J.
Chicago Specialty Mfg. Co., 332 N. Western Ave., Chicago, Ill.
Cooper Sanitary Co., 3316 Race St., Philadelphia, Pa.
Desolvo Co., The, 31 Terminal Way, Pittsburgh, Pa.
Dole Valve Co., 1901-41 Carroll Ave., Chicago, Ill.
General Scientific Equipment Co., 2735 N. Broad St., Philadelphia, Pa.
Hercules Chemical Co., Inc., 332 Canal St., New York, N. Y.
Johns-Manville, 22 E. 40th St., New York, N. Y.
Krehbiel, J. H., 425 N. Crawford Ave., Chicago, Ill.
Metropolitan Refining Co., Inc., 50-23 23rd St., Long Island City, N. Y.
National Engineering Products, Inc., Commerce and Savings Bldg., Washington, D. C.
Permatex Co., Inc., Sheepshead Bay, N. Y.
Radiator Specialty Co., Charlotte, N. C.
Star Products Co., 130 Walnut Ave., New York, N. Y.
Vinco Co., Inc., The, 305 E. 45th St., New York, N. Y.
X Laboratories, Inc., 25 W. 45th St., New York, N. Y.

COMPOUNDS
Caulking

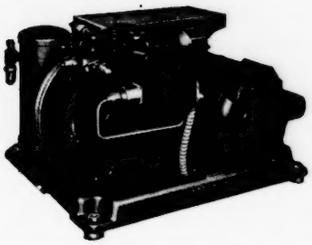
Accurate Metal Weather Strip Co., 216 E. 26th St., New York, N. Y.
Acme Refining Co., The, W. 56th & W. & L. E. Ry., Cleveland, O.
All Metal Weatherstrip Co., 229 W. Illinois St., Chicago, Ill.
Alpha Metal & Rolling Mills, Inc., 363 Hudson Ave., Brooklyn, N. Y.
American Metal Weather Strip Co., 144 N. Division Ave., Grand Rapids, Mich.
Armstrong Co., The, Post Ave., and South St., Detroit, Mich.
Atlas Asbestos Co., Ltd., 110 McGill St., Montreal, Que., Canada.
Barber Asphalt Corp., Barber, N. J.
Barland Weatherstrip Material Co., 5600 Curtis Ave., Cleveland, O.
Calbar Paint & Varnish Co., 2612-26 N. Martha St., Philadelphia, Pa.
Carey Co., The, Philip, Wayne Ave., Lockland, Cincinnati, O.
Chamberlin Metal Weather Strip Co., 1254 La Brosse St., Detroit, Mich.
Clinton Metallic Paint Co., P. O. Box 278, Clinton, N. Y.
Continental Products Co., 1150 E. 222nd St., Euclid, O.
Diamond Metal Weather Strip Co., 661 N. Fourth St., Columbus, O.
Hetzel Roofing Products Co., 67 Main St., Newark, N. J.
Horn Co., A. C., 43-36 Tenth St., Long Island City, N. Y.
Iowa Paint Mfg. Co., 118-20 Eighth St., Des Moines, Ia.
Johns-Manville, 22 E. 40th St., New York, N. Y.
Krehbiel, J. H., 425 N. Crawford Ave., Chicago, Ill.
Lastik Products Co., Inc., 604 American Bank Bldg., Pittsburgh, Pa.
Metropolitan Refining Co., Inc., 50-23 23rd St., Long Island City, N. Y.
National Mfg. Corp., 151 Fillmore St., Tonawanda, N. Y.
Ohmlac Paint & Refining Co., 6540 S. Central Ave., Chicago, Ill.
Pecora Paint Co., 4th & Penna. R. R., Philadelphia, Pa.
Plastic Products Co., 6475 Georgia Ave., Detroit, Mich.
Pyrolite Products Co., 1221-31 W. 74th St., Cleveland, O.
Radiator Specialty Co., Charlotte, N. C.
Reilly Tar & Chemical Corp., 1615 Merchants Bank Bldg., Indianapolis, Ind.
Robertson Co., H. H., 2000 Grant Bldg., Pittsburgh, Pa.
Sauereisen Cements Co., 2308 Main St., Sharpsburg, Pa.
Smooth-On Mfg. Co., 568-574 Communipaw Ave., Jersey City, N. J.
Thompson & Co., Box 6757, Pittsburgh, Pa.
Wilhelm Co., A., 3rd and Bern Sts., Reading, Pa.
X-Pando Corp., 4315 Thirty-Sixth St., Long Island City, N. Y.
Yardley Screen & Weather Strip Corp., 138 Parsons Ave., Columbus, O.

COMPOUNDS
Pipe Joint

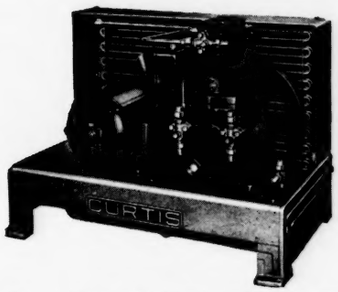
Acme Refining Co., W. 56th & W. & L. E. Ry., Cleveland, O.
Atlas Asbestos Co., Ltd., 110 McGill St., Montreal, Que., Canada.
Continental Products Co., 1150 E. 222nd St., Euclid, O.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Crane Packing Co., 1801 Belle Plain Ave., Chicago, Ill.
Dixon, Joseph, Crucible Co., 170 Wayne Ave., Jersey City, N. J.
Garlock Packing Co., 400 Main St., Palmyra, N. Y.
Grinnell Co., Inc., Providence, R. I.
Hercules Chemical Co., Inc., 332 Canal St., New York, N. Y.
Horn Co., A. C., 43-36 Tenth St., Long Island City, N. Y.
Key Co., Alta Sita, East St. Louis, Ill.
Keystone Lubricating Co., 21st & Clearfield Sts., Philadelphia, Pa.
Krehbiel, J. H., 425 N. Crawford Ave., Chicago, Ill.
Metropolitan Refining Co., Inc., 50-23 23rd St., Long Island City, N. Y.
National Engineering Products, Inc., Commerce & Savings Bldg., Washington, D. C.
Ohio Injector Co., Wadsworth, O.
Preferred Utilities Mfg. Corp., 33 W. 60th St., New York, N. Y.
Quigley Co., Inc., 56 W. 45th St., New York, N. Y.
Radiator Specialty Co., Charlotte, N. C.
Reilly Tar & Chemical Corp., 1615 Merchants Bank Bldg., Indianapolis, Ind.
Rockwood Sprinkler Co., 54 Harlow St., Worcester, Mass.
Smooth-On Mfg. Co., D-30, 572 Communipaw Ave., Jersey City, N. J.
Thompson & Co., Box 6757, Pittsburgh, Pa.
U. S. Graphite Co., Saginaw, Mich.
Wilhelm Co., A., 3rd and Bern Sts., Reading, Pa.
X-Pando Corp., 43-15 36th St., Long Island City, N. Y.

COMPRESSORS, REFRIGERATION
Centrifugal (C), Reciprocating (R), Steam Jet (S)

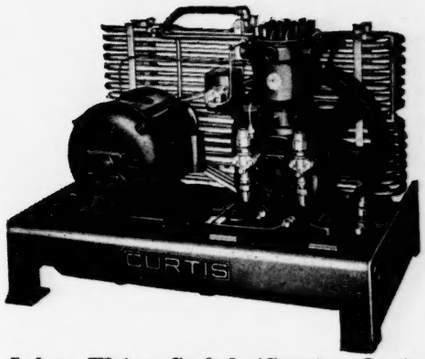
Airtemp, Div. of Chrysler Corp., Leo St., Dayton, O. (Radial) (R)
American-Marsh Pumps, Inc., 100 Capital Ave., N. E., Battle Creek, Mich.
Baker Ice Machine Co., Inc., 1508 Evans St., Omaha, Nebr. (R)
Brunner Mfg. Co., 1821 E. Broad St., Utica, N. Y. (R)
Carbondale Division Worthington Pump & Machinery Corp., Harrison, N. J. (C) (R) (S)
Carrier Corp., 302 S. Geddes St., Syracuse, N. Y. (C) (R) (S)
Copeland Refrigeration Corp., Sidney, O. (C)
Corozone Air Conditioning Corp., 1422 Euclid Ave., Cleveland, O. (C)
Croll-Reynolds Engrg. Co., Inc., 17 John St., New York, N. Y. (S)
Curtis Refrigerating Machine Co., 1950 Kienlen Ave., St. Louis, Mo. (R)
DeLaval Steam Turbine Co., 300 Nottingham Way, Trenton, N. J. (C)
De La Vergne Engine Co., Philadelphia, Pa. (R)
Elliott Co., Jeannette, Pa. (S)
Fairbanks, Morse & Co., 600 Michigan Ave., Chicago, Ill. (R)
Foster Wheeler Corp., 165 Broadway, New York, N. Y. (S)
Frick Co., Waynesboro, Pa. (R)
Frigidaire Commercial & Air Conditioning Div., General Motors Sales Corp., Dayton, O. (R)
Gardner-Denver Co., Quincy, Ill. (R)
General Electric Co., Air Conditioning and Commercial Refrigeration Dept., 5 Lawrence St., Bloomfield, N. J. (R)
General Machinery Co., 3500 Riverside Ave., Spokane, Wash. (R)
General Refrigeration Div., Yates-American Machine Co., Beloit, Wis. (R)
Hardy Mfg. Co., Inc., 126 Davis Ave., Dayton, O. (R)
Howe Ice Machine Co., 2825 Montrose Ave., Chicago, Ill. (R)
Ingersoll-Rand, 11 Broadway, New York, N. Y. (R) (S)
Kauffman Air Conditioning Corp., 4336 W. Pine Blvd., St. Louis, Mo. (R)
Kelvinator Div., Nash-Kelvinator Corp., 14250 Plymouth Rd., Detroit, Mich. (R)
Merchant & Evans Co., 2035 Washington Ave., Philadelphia, Pa. (R)
Mills Novelty Co., 4110 W. Fullerton Ave., Chicago, Ill. (R)
Modern Equipment Corp., Defiance, O. (R)
Nash Refrigeration Co., Inc., 79 Pointer St., Newark, N. J. (R)
Norge Div. Borg-Warner Co., 670 E. Woodbridge St., Detroit, Mich. (R)
Perfection Refrigeration Parts Co., Harvey, Ill.
Phoenix Ice Machine Co., 2711 Church St., Cleveland, O. (R)
Ranco Inc., 601 W. 5th Ave., Columbus, O.
Reliance Refrigerating Machine Co., 3401 N. Kedzie Ave., Chicago, Ill. (R)
Ross Heater & Mfg. Co., Inc., 1407 West Ave., Buffalo, N. Y. (S)
Schutte & Koerting Co., 12th & Thompson Sts., Philadelphia, Pa. (S)
Servel, Inc., Electric Refrigeration & Air Conditioning Div., 119 Morton Ave., Evansville, Ind. (R)
Starr Co., 1 Main St., Richmond, Ind. (R)
Stewart Ice Machine Co., 1046 E. 22nd St., Los Angeles, Cal. (R)
Tecumseh Products Co., Tecumseh, Mich. (R)
Trane Co., The, La Crosse, Wis. (C) (R)
Triumph Ice Machine Co., 107-109 E. Front St., Cincinnati, O. (R)
Uniflow Mfg. Co., E. Lake Rd., Erie, Pa. (R)
Universal Cooler Corp., Green & Melville Aves., Detroit, Mich. (R)



1/6 to ½ h.p. Self-Contained Condensing Unit.

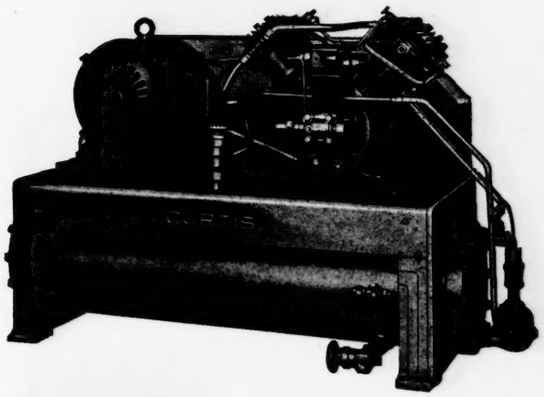


1½ h.p. Air-Cooled Condensing Unit. Other sizes from ¼ to 5 h.p.



5 h.p. Water-Cooled (Counter-flow) Condensing Unit. Other sizes from 1/3 to 5 h.p.

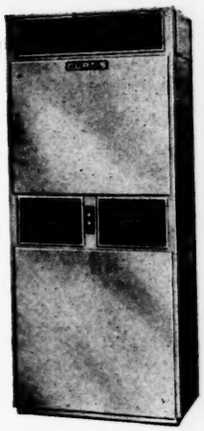
Get "Plus Profits Value" *with the Complete* CURTIS *Line!*



COMMERCIAL REFRIGERATION

45 air-cooled condensing units from 1/6 to 5 h.p., inclusive, and 47 water-cooled units from 1/3 to 30 h.p., inclusive. All models available for either Freon (F 12) or Methyl Chloride.

Special models are available for ice cream, frozen food cabinets and for the dairy industry.



Above: 15 h.p. Cleanable Shell and Tube Condensing Unit. Other sizes from 3 to 30 h.p.

At Left: 3 and 5 ton Packaged Type Air Conditioner.

Below: 7½, 10, 15 ton Remote or Central Type Air Conditioner.

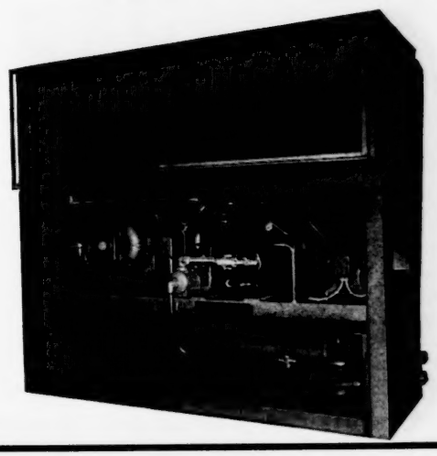
AIR CONDITIONING

For stores, offices and all types of commercial establishments Curtis offers complete packaged, refrigerated air conditioning units, requiring only water and electrical connections to install. Cools, dehumidifies, circulates and filters the air. Eliminates costly installation expense. Adaptable for heating. 5 to 15 ton sizes.

Curtis Design Features Include:

- Centro-Ring Positive Pressure Lubrication
- Timken Tapered Roller Bearings (models above 3/4 h.p.)
- Removable Cylinder Heads
- Drop forged, alloy steel, heat treated crankshaft and connecting rods
- Balanced sylphon bellows seal
- Unusually large receivers and condensers

CURTIS REFRIGERATION AIR CONDITIONING AND COMMERCIAL



CURTIS REFRIGERATING MACHINE COMPANY

Division of Curtis Manufacturing Co.

Established 1854 **1999 Kienlen Ave., St. Louis, Missouri**

Vilter Mfg. Co., 2148 S. First St., Milwaukee, Wis. (R)
Westinghouse Electric & Mfg. Co., East Springfield, Mass. (R)
Westinghouse Electric & Mfg. Co., Springfield, Mass. (C) (R)
Wheeler Mfg. Co., C. H., 19th, Lehigh & Sedgley Aves., Philadelphia, Pa. (S)
Williams Oil-O-Matic Heating Corp., 1201 East Bell, Bloomington, Ill. (R)
Wittenmeier Machinery Co., 850-860 N. Spaulding Ave., Chicago, Ill. (R)
X L Refrigerating Co., 1834 W. 59th St., Chicago, Ill. (R)
York Ice Machinery Corp., Roosevelt Ave., York, Pa. (R)

CONDENSATION METERS

(See Meters, Condensation)

CONDENSATION RETURN PUMPS

(See Pumps)

CONDENSERS, REFRIGERANT

Evaporative (E), Shell & Tube (S&T), Shell & Coil (S&C)

Acme Industries, Inc., Cor. Mechanic and Ganson Sts., Jackson, Mich. (E)
Advanced Refrigerating Systems Co., 33rd and Arch Sts., Philadelphia, Pa. (S & T)
American-Marsh Pumps, Inc., 100 Capital Ave., N. E., Battle Creek, Mich.
Baker Ice Machine Co., Inc., 1508 Evans St., Omaha, Nebr. (E) (S & T)
Buffalo Forge Co., 171 Mortimer St., Buffalo, N. Y. (E)
Bush Mfg. Co., 100 Wellington St., Hartford, Conn. (S & T)
Carbondale Division Worthington Pump & Machinery Corp., Harrison, N. J. (E) (S & T) (S & C)
Carrier Corp., 302 S. Geddes St., Syracuse, N. Y. (E) (S & T)
Curtis Refrigerating Machine Co., 1950 Kienlen Ave., St. Louis, Mo. (E)
De La Vergne Engine Co., Philadelphia, Pa. (S & T)
Devine Mfg. Co., Inc., J. P., 909 Shawnee Ave., Mt. Vernon, Ill. (S & T)
Drayer & Hanson, Inc., 738 E. Pico Blvd., Los Angeles, Cal. (E) (S & T)
Fedders Mfg. Co., Inc., 57 Tonawanda St., Buffalo, N. Y. (E)
Frank Heaters, Inc., 150 Railroad Ave., Paterson, N. J.
Frick Co., Waynesboro, Pa. (E) (S & T)
Frigidaire Commercial & Air Conditioning Div., General Motors Sales Corp., Dayton, O. (E) (S & T)
General Electric Co., Air Conditioning and Commercial Refrigeration Dept., 5 Lawrence St., Bloomfield, N. J. (E)
G. & O. Mfg. Co., 138 Winchester Ave., New Haven, Conn. (S & T)
General Refrigeration Div., Yates-American Machine Co., Beloit, Wis. (E) (S & T)
Governair Corp., 605 W. Main St., Oklahoma City, Okla. (E)
Harrison Radiator Div., Lockport, N. Y. (E)
Hess Warming & Ventilating Co., 1211 S. Western Ave., Chicago, Ill. (E)
Howe Ice Machine Co., 2825 Montrose Ave., Chicago, Ill. (S & T)
Kelvinator Div., Nash-Kelvinator Corp., 14250 Plymouth Rd., Detroit, Mich. (E) (S & T)
Kramer Trenton Co., 626 Brunswick Ave., Trenton, N. J. (E) (S & T)
Larkin Coils, Inc., 519 Memorial Dr., S. E., Atlanta, Ga. (E)
Long Mfg. Co., Div. Borg-Warmer Corp., 12501 Dequendie St., Detroit, Mich. (E)
Manufacturers Fin Coil Co., 2505-7 S. Pulaski Rd., Chicago, Ill. (S & T)
Marlo Coil Co., 6135 Manchester Ave., St. Louis, Mo. (E)
McQuay, Inc., 1600 Broadway, N. E., Minneapolis, Minn. (E)
Motor Equipment Co., 214 W. Douglas, Wichita, Kans. (E)
Norge Div., Borg-Warner Corp., 670 E. Woodbridge St., Detroit, Mich. (E) (S & T)
Ohio Pipe Bending & Machine Co., 3900-3910 Trent Ave., Cleveland, O. (E)
Patterson-Kelley Co., Inc., East Stroudsburg, Pa. (S & T)
Peerless of America, Inc., 515 W. 35th St., Chicago, Ill. (E) (S & C)
Ranco Inc., 601 W. 5th Ave., Columbus, O. (C) (R)
Refrigeration Economics Co., Inc., 1232 Second St., N. E., Canton, O. (S & T)
Reliance Refrigerating Machine Co., 3401 N. Kedzie Ave., Chicago, Ill. (S & T)
Research Corp., Chrysler Bldg., New York, N. Y. (E)
Richmond Engrg. Co., Inc., 7th and Hospital Sts., Richmond, Va. (S & T) (E)
Roessing Mfg. Co., 16161 Noble St., Sharpsburg Sta., Pittsburgh, Pa. (S & T)
Rome-Turney Radiator Co., Canal St., Rome, N. Y. (S & T)
Ross Heater & Mfg. Co., Inc., 1407 West Ave., Buffalo, N. Y. (S & T)
Schutte & Koerting Co., 12th & Thompson Sts., Philadelphia, Pa. (E) (S & T) (S & C)
Servel, Inc., Electric Refrigeration & Air Conditioning Div., 119 Morton Ave., Evansville, Ind. (S & T)
Stewart Ice Machine Co., 1046 E. 22nd St., Evansville, Ind. (E) (S & T)
Struthers-Wells-Titusville Co., Warren, Pa. (S & T)
Trane Co., The, La Crosse, Wis. (E)
Triumph Ice Machine Co., 107-109 E. Front St., Cincinnati, O. (S & T)
Typhoon Air Conditioning Co., 252 W. 26th St., New York, N. Y. (E)
Unit Heater & Cooler Co., 1002-1024 Third St., Wausau, Wis. (S & T)
Vilter Mfg. Co., 2148 S. First St., Milwaukee, Wis. (E)
Vogt Machine Co., Henry, 10th & Ormsby Sts., Louisville, Ky. (S & T)
Westinghouse Electric & Mfg. Co., Springfield, Mass. (E) (S & T) (S & C)
Wittenmeier Machinery Co., 850-860 N. Spaulding Ave., Chicago, Ill. (S & T) (S & C)
X L Refrigerating Co., 1834 W. 59th St., Chicago, Ill. (E) (S & T)
Yates-American Machine Co., Beloit, Wis. (E)
York Ice Machinery Corp., Roosevelt Ave., York, Pa. (E) (S & T)
Young Radiator Co., 709 S. Marquette St., Racine, Wis. (E) (S & T)

CONDUIT

For Underground Pipe

American District Steam Co., Bryant St., North Tonawanda, N. Y.
Dickey Clay Mfg. Co., W. S., 20 W. 9th St., Kansas City, Mo.
Dockstader, S. E., 1128 Munsey Bldg., Washington, D. C.
Ehret Magnesia Mfg. Co., Valley Forge, Pa.
Johns-Manville, 22 E. 40th St., New York, N. Y.
Michigan Pipe Co., 503 Phoenix Bldg., Bay City, Mich.
Porter & Co., Inc., H. W., 825 Frelinghuysen Ave., Newark, N. J.
Ric-wil Co., 1563 Union Commerce Bldg., Cleveland, O.
Underground Steam Construction Co., 73 Pitts St., Boston, Mass.
Wyckoff & Son Co., A., 100 Home St., Elmira, N. Y.

CONNECTORS, DUCT

Flexible

Canvas Products Co., 1236 S. 7th St., St. Louis, Mo.
Carpenter & Co., Geo. B., 440 N. Wells St., Chicago, Ill.
Wilson, Inc., Grant, 4115 W. Taylor St., Chicago, Ill.

CONTROL ASSEMBLIES

Oil Burner (O), Stoker (S)

Au-Temp-Co Corp., 1 Park Ave., New York. N. Y. (O) (S)
Automatic Products Co., 2450 N. 32nd St., Milwaukee, Wis. (O)
Detroit Lubricator Co., 5900 Trumbull Ave., Detroit, Mich. (O) (S)
Friez & Sons, Julien P., 4 N. Central Ave., Baltimore, Md. (S)
General Controls Co., 700 W. Ivy St., Glendale, Cal. (O)
General Electric Co., Air Conditioning and Commercial Refrigeration Dept., Bloomfield, N. J. (O) (S)
Gleason-Avery, Inc., 27 Clark St., Auburn, N. Y. (S)
Lewe.lyn Mfg. Co., Columbus, Ind.
Mercoid Corp., The, 4201 Belmont Ave., Chicago, Ill. (O) (S)
Minneapolis-Honeywell Regulator Co., 2701 Fourth Ave., Minneapolis, Minn. (O) (S)
Penn Electric Switch Co., Box 556, Goshen, Ind. (O) (S)
Pioneer Heat Regulator Div., Master Electric Co., 100 Davis Ave., Dayton, O. (S)
Sampsel Time Control Inc., Spring Valley, Ill. (S)
Shallcross Controls, Inc., 121 N. Boadway, Milwaukee, Wis.
Spencer Thermostat Co., 34 Forest St., Attleboro, Mass. (S)
United Electric Controls Co., 69 "A" St., South Boston, Mass. (O)
White-Rodgers Electric Co., 1289 Cass Ave., St. Louis, Mo.

CONTROLLERS-STARTERS

For Electric Motors

Allen-Bradley Co., 1335 S. First St., Milwaukee, Wis.
Allis-Chalmers Mfg. Co., 1126 S. 70th St., Milwaukee, Wis.
Arrow-Hart & Hegeman Elect. Co., 103 Hawthorn St., Hartford, Conn.
Clark Controller Co., 1146 E. 152nd St., Cleveland, O.
Cutler-Hammer. Inc., N. 12th St. and W. St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., 2700 E. 79th St., Cleveland, O.
Electric Machinery Co., 1331 Tyler St., N. E., Minneapolis, Minn.
General Electric Co., 1 River Rd., Schenectady, N. Y.
Hart Mfg. Co., Hamilton St., Hartford, Conn.
Monitor Controller Co., 51 S. Gay St., Baltimore, Md.
Penn Electric Switch Co., Box 556, Goshen, Ind.
Reynolds Electric Co., 2650 W. Congress, Chicago, Ill.
Square D Co., 4041 N. Richards St., Milwaukee, Wis.
Ward Leonard Electric Co., 37 South St., Mt. Vernon, N. Y.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

CONTROLS

Controller-Recorder

(See Recorder-Controller)

CONTROLS

Combustion, Stack

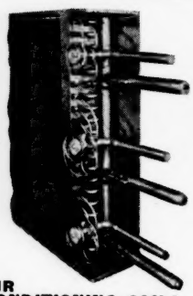
Line Voltage (L), Low Voltage (V)

Brooke Engineering Co., Inc., 4517 Wayne Ave., Philadelphia, Pa.

Marlo Coil Co.

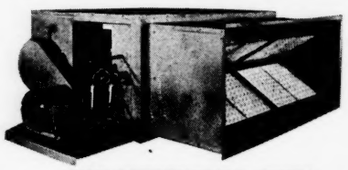
6135 MANCHESTER AVE.,

ST. LOUIS, MO.



AIR CONDITIONING COILS—BLAST COILS

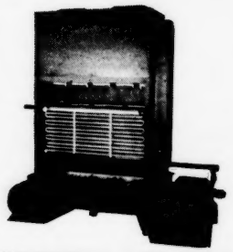
Extended surface coils for all refrigerants. Made of any of the common metals. Blast coils for steam, water, or brine. Complete details in Bulletin No. 396.



AIR CONDITIONING UNITS

Air Conditioning Units in either ceiling suspended or floor type. Capacities from 900 cu. ft. to 12,000 cu. ft. Sturdily built on welded angle iron frames of sectional design for easy installation. Bulletin No. 409 gives complete details.

Refrigeration Equipment Manufacturers



EVAPORATIVE CONDENSER

Self-contained; single motor drive for fans and pump; all prime surface coils; electric welded frame galvanized after fabrication; internal surface covered with corrosion resistant mastic. Full details in Bulletin No. 404.

V-591

Simplifies selection of propeller fan blades

The thing that we appreciate about your new Airistocrat Catalog is the reliability of the information, as we find from our laboratory tests that the information given is very accurate and checks very closely with the results which we secure.

D. F. JONES, C. E.
Motor Wheel Corporation
Duo-Therm Division

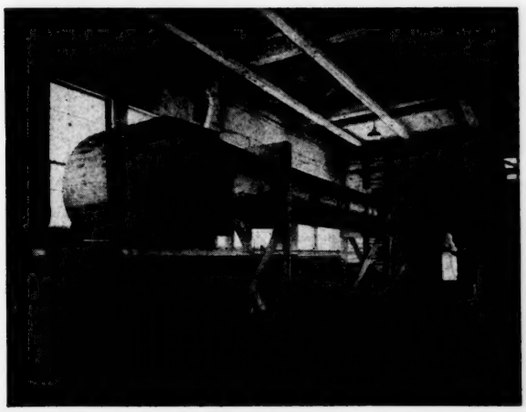
TORRINGTON RESEARCH LABORATORIES SUPPLY ENGINEERING DATA TO MAKE FAN BLADE BUYING ACCURATE AND EASY

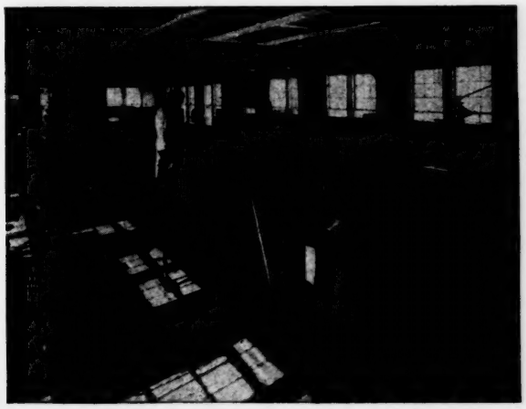
This new Torrington Catalog includes between two covers the complete line of Torrington Propeller-Type Fan Blades with full illustrations, detailed specifications and accurate performance characteristics for each blade. It also includes fundamental fan laws and an explanation of the several standard methods for testing propeller fan blades. Design engineers will find this complete and authoritative guide invaluable. Cleverly arranged for rapid reference, the Torrington Fan Blade Catalog contains the answers to all ordinary questions regarding specifications and performance —all guaranteed by experienced Torrington Engineers.

Write today for this valuable data book — you will find it very useful in planning and specifying Fan Blade requirements.

A PART OF OUR RESEARCH AND DEVELOPMENT LABORATORY WITH EQUIPMENT FOR PRESSURE TESTING OF LARGE DIAMETER PROPELLER FAN BLADES BY NAFM OR ASHVE CODES

NEMA FREE AIR TEST EQUIPMENT IN CENTER FOREGROUND. SPECIAL ATTIC FAN BLADE TEST BOX IN BACKGROUND AND SMALL NAFM OR ASHVE CODE EQUIPMENT AT THE LEFT.





THE TORRINGTON MANUFACTURING COMPANY

Torrington-Connecticut

Burling Instrument Co., 4 Belmont Ave., Newark, N. J. (V)
Cook Electric Co., 2700 Southport Ave., Chicago, Ill. (L) (V)
Defender Automatic Regulator Co., 308 S. 8th St., St. Louis, Mo.
General Controls Co., 700 W. Ivy St., Glendale, Cal. (L)
General Gas Controls Co., Glendale, Cal.
Gilbert & Barker Mfg. Co., Springfield, Mass.
Hays Corp., E. Eighth St., Michigan City, Ind. (L)
Magnet Switch Co., 356 W. Huron St., Chicago, Ill. (V)
Mercoid Corp., 4201 Belmont Ave., Chicago, Ill. (L) (V)
Minneapolis-Honeywell Regulator Co., 2726 Fourth Ave., S. Minneapolis, Minn. (L) (V)
Penn Electric Switch Co., Box 556, Goshen, Ind. (V)
Perfex Corporation, 500 W. Oklahoma Ave., Milwaukee, Wis. (L) (V)
Pioneer Heat Regulator Div., Master Electric Co., 100 Davis Ave., Dayton, O. (L) (V)
Russell Electric Co., 342 W. Huron St., Chicago, Ill. (L) (V)
Shallcross Controls, Inc., 121 N. Broadway, Milwaukee, Wis.
United Electric Controls Co., 69 "A" St., South Boston, Mass. (L)
Webster Engineering Co., 419 W. Second St., Tulsa, Okla.
White Manufacturing Co., 2362 University Ave., St. Paul, Minn. (V)
White-Rodgers Electric Co., 1289 Cass Ave., St. Louis, Mo.

CONTROLS
Humidity

American Moistening Co., 260 W. Exchange St., Providence, R. I.
Anemostat Corp. of America, 10 E. 39th St., New York, N. Y.
Au-Temp-Co Corp., 1 Park Ave., New York, N. Y.
Bahnson Co., R. J. Reynolds Bldg., Winston-Salem, N. C.
Barber-Colman Co., 225 Loomis St., Rockford, Ill.
Bristol Co., Platts Bridge, Waterbury, Conn.
Detroit Lubricator Co., 5900 Trumbull Ave., Detroit, Mich.
Foxboro Co., 106 Neponset Ave., Foxboro, Mass.
Friez & Sons, Julien P., 4 N. Central Ave., Baltimore, Md.
G. M. Mfg. Co., P. O. Box 151, Madison Square Sta., New York, N. Y.
General Electric Co., Air Conditioning and Commercial Refrigeration Dept., 5 Lawrence St., Bloomfield, N. J.
Gilbert & Barker Mfg. Co., Springfield. Mass.
H-B Instrument Co., 2518 N. Broad St., Philadelphia, Pa.
Johnson Service Co., 507 E. Michigan St., Milwaukee, Wis.
Johnson Tool Co., Inc., 65-67 Massasoit Ave., East Providence, R. I.
Leeds & Northrup Co., 4970 Stenton Ave., Philadelphia, Pa.
Mason-Neilan Regulator Co., 1190 Adams St.. Boston, Mass.
McDonnell & Miller, 400 N. Michigan Ave., Chicago, Ill.
Minneapolis-Honeywell Regulator Co., 2701 Fourth Ave., South, Minneapolis, Minn.
Parks-Cramer Co., 970 Main St., Fitchburg. Mass.
Penn Electric Switch Co., Box 556, Goshen, Ind.
Perfex Corp. (Contols Div.), 500 W. Oklahoma Ave., Milwaukee, Wis.
Powers Regulator Co., 2720 Greenview Ave., Chicago, Ill.
Spencer Thermostat Co., 43 Forest St., Attleboro, Mass.
Standard Engineering Wks., 289 Roosevelt Ave., Pawtucket, R. I.
Steamaire Co., Cincinnati, O.
Supreme Electric Products Corp., 99 Mt. Hope Ave., Rochester, N. Y.
Tagliabue Mfg. Co., C. J., 540 Park Ave., Brooklyn, N. Y.
Taylor Instrument Companies, 95 Ames St., Rochester, N. Y.
Trerice Co., H. O., 1420 W. Lafayette Blvd., Detroit, Mich.
Wheelco Instruments Co., 1933 S. Halsted St., Chicago, Ill.
White-Rodgers Electric Co., 1289 Cass Ave., St. Louis, Mo.

CONTROLS
Temperature

Atlas Valve Co., Inc., 282 South St., Newark, N. J.
Au-Temp-Co Corp., 1 Park Ave., New York, N. Y.
Automatic Products Co., 2450 N. 32nd St., Milwaukee, Wis.
Automatic Temperature Control Co., Inc., 22 E. Logan St., Philadelphia, Pa.
Baker Ice Machine Co., Inc., 1508 Evans St., Omaha, Neb.
Barber-Colman Co., 225 Loomis St., Rockford, Ill.
Bell & Gossett Co., 3000 Wallace St., Chicago, Ill.
Boiler Room Equipment, Inc., 45 W. 45th St., New York, N. Y.
Bristol Co., Platts Bridge, Waterbury, Conn.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., 4534 Wayne Ave., Philadelphia, Pa.
Burling Instrument Co., 4 Belmont Ave., Newark, N. J.
Cook Electric Co., 2700 Southport Ave., Chicago, Ill.
Cooper Co., Clark, 159 Jefferson St., Philadelphia, Pa.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Defender Automatic Regulator Co., 308 S. 8th St., St. Louis, Mo.
Detroit Lubricator Co., 5900 Trumbull Ave., Detroit, Mich.
Dunham Co., C. A., 450 E. Ohio St., Chicago, Ill.
Eclipse Fuel Engineering Co., 707 S. Main St., Rockford, Ill.
Edison, Inc., Thomas A., Edison Electrical Controls Div., Lakeside Ave., West Orange, N. J.
Electrimatic Corp., 2100 Indiana Ave., Chicago, Ill.
Fischer-Smith, Inc., West Englewood, N. J.
Foster Engineering Co., 109 Monroe St., Newark, N. J.
Foxboro Co., 106 Neponset Ave., Foxboro, Mass.
Friez & Sons, Julien P., 4 N. Central Ave., Baltimore, Md.
Fulton Sylphon Co., Knoxville, Tenn.
General Controls Co., 700 W. Ivy St., Glendale, Cal.
General Electric Co., Air Conditioning & Commercial Ref. Dept., 5 Lawrence St., Bloomfield, N. J.
General Fittings Co., 123 Georgia Ave., Providence, R. I.
Gilbert & Barker Mfg. Co., Springfield, Mass.
Gleason-Avery Inc., 27 Clark St., Auburn, N. Y.
H-B Instrument Co., 2518 N. Broad St., Philadelphia, Pa.
Herske & Timmis, Inc., 33 W. 60th St., New York, N. Y.
Illinois Engineering Co., 2035 S. Racine Ave., Chicago, Ill.
Johnson Service Co., 507 E. Michigan St., Milwaukee, Wis.
Keckley Co., O. C., 400 W. Madison St., Chicago, Ill.
Klipfel Mfg. Co., 2651 W. Harrison St., Chicago, Ill.
Lawler Automatic Controls, Inc., 453 N. MacQuesten Pkwy., Mount Vernon, N. Y.
Leeds & Northrup Co., 4970 Stenton Ave., Philadelphia, Pa.
Leslie Co., Valley Brook & Grant Aves., Lyndhurst, N. J.
Locke Regulator Co., 76 North St., Salem, Mass.
Manning, Maxwell & Moore, Inc., American Schaeffer & Budenberg Instrument Div., 11 Elias St., Bridgeport, Conn.
Marsh, Corp., Jas. P., 2089 Southport Ave., Chicago, Ill.
Marsh Tritrol Co., 600 S. Michigan Ave., Chicago, Ill.
Mason-Neilan Regulator Co., 1190 Adams St., Boston, Mass.
McAlear Mfg. Co., 1901-1909 S. Western Ave., Chicago, Ill.
McCorkle Co., D. H., 6th & Bancroft Way, Berkeley, Cal.
Mercoid Corp., The, 4201 Belmont Ave., Chicago, Ill.
Minneapolis-Honeywell Regulator Co., 2701 Fourth Ave., South, Minneapolis, Minn.
Monitor Controller Co., 51 S. Gay St., Baltimore, Md.
Paragon Electric Co., 37 W. Van Buren St., Chicago, Ill.
Penn Electric Switch Co., Box 556, Goshen, Ind.
Perfex Corp. (Controls Div.), 500 W. Oklahoma Ave., Milwaukee, Wis.
Pioneer Heat Regulator Div., Master Electric Co., The, 100 Davis Ave., Dayton, O.
Powers Regulator Co., 2720 Greenview Ave., Chicago, Ill.
Precision Thermometer & Instrument Co., 1434 Brandywine St., Philadelphia, Pa.
Pyrometer Instrument Co., 103 Lafayette St., New York, N. Y.
Ranco Inc., 601 W. 5th Ave., Columbus, O.
Reading-Pratt & Cady Div., American Chain & Cable Co., Inc., Reading, Pa.
Ruggles-Klingemann Mfg. Co., 4 Foster Ct., Salem, Mass.
Sarco Co., Inc., 183 Madison Ave., New York, N. Y.
Spence Engineering Co., Inc., 28 Grant St., Walden, N. Y.
Spencer Thermostat Co., 43 Forest St., Attleboro, Mass.
Square D Co., 6060 Rivard St., Detroit, Mich.
Square D Co., 4041 N. Richards St., Milwaukee, Wis.
Sterling, Inc., 3738 N. Holton St., Milwaukee, Wis.
Tagliabue Mfg. Co., C. J., 540 Park Ave., Brooklyn, N. Y.
Taylor Instrument Companies, 95 Ames St., Rochester, N. Y.
Teeple Mfg. Co., L. R., Portland, Ore.
Trerice Co., H. O., 1420 W. Lafayette Blvd., Detroit, Mich.
United Electric Controls Co., 69 A St., Boston, Mass.
Watson & McDaniel Co., 440 N. Marshall, Philadelphia, Pa.
Wheelco Instruments Co., 1933 S. Halsted St., Chicago, Ill.
White Mfg. Co., 2362 University Ave., St. Paul, Minn.
White-Rodgers Electric Co., 1289 Cass Ave., St. Louis, Mo.

CONTROLS
Weather Compensated

Au-Temp-Co Corp., 1 Park Ave., New York, N. Y.
Barber-Colman Co., 225 Loomis St., Rockford, Ill.
Bristol Co., Platts Bridge, Waterbury, Conn.
Brown Instrument Co., Div. Minneapolis-Honeywell Regulator Co., 4534 Wayne Ave., Philadelphia, Pa.
Detroit Lubricator Co., 5900 Trumbull Ave., Detroit, Mich.
Fischer-Smith, Inc., West Englewood, N. J.
Foxboro Co., 106 Neponset Ave., Foxboro, Mass.
Gilbert & Barker Mfg. Co., Springfield, Mass.
Herske & Timmis, Inc., 33 W. 60th St., New York, N. Y.
Illinois Engineering Co., 2035 S. Racine Ave., Chicago, Ill.
Johnson Service Co., 507 E. Michigan St., Milwaukee, Wis.
Lawler Automatic Controls, Inc., 453 N. MacQuesten Pkwy., Mount Vernon, N. Y.
Leeds & Northrup Co., 4970 Stenton Ave., Philadelphia, Pa.
Marsh Tritrol Co., 600 S. Michigan Ave., Chicago, Ill.
Minneapolis-Honeywell Regulator Co., 2701 Fourth Ave., South, Minneapolis, Minn.
Powers Regulator Co., 2720 Greenview Ave., Chicago, Ill.
R. C. A. Mfg. Co., Camden, N. J.
Sarco Co., Inc., 183 Madison Ave., New York, N. Y.
Spence Engineering Co., 28 Grant St., Walden, N. Y.
Spencer Thermostat Co., 34 Forest St., Attleboro, Mass.
Tagliabue Mfg. Co., C. J., 540 Park Ave., Brooklyn, N. Y.
Taylor Instrument Companies, 95 Ames St., Rochester, N. Y.
Thrush & Co., H. A., 21 E. Riverside Dr., Peru, Ind.
United Electric Controls Co., 69 A St., Boston, Mass.

CONTROLS
Zone

Au-Temp-Co Corp., 1 Park Ave., New York, N. Y.
Automatic Temperature Control Co., Inc., 22 E. Logan St., Philadelphia, Pa.
Barber-Colman Co., 225 Loomis St., Rockford, Ill.
Barnes & Jones, Inc., 128 Brookside Ave., Jamaica Plain, Boston, Mass.
Cook Electric Co., 2700 Southport Ave., Chicago, Ill.
Cooper Co., Clark, 159 Jefferson St., Philadelphia, Pa.
Dunham Co., C. A., 450 E. Ohio St., Chicago, Ill.
Foxboro Co., 106 Neponset Ave., Foxboro, Mass.
General Controls Co., 700 W. Ivy St., Glendale, Cal.
Herske & Timmis, Inc., 33 W. 60th St., New York, N. Y.
Illinois Engineering Co., 2035 S. Racine Ave., Chicago, Ill.
Johnson Service Co., 507 E. Michigan St., Milwaukee, Wis.
Marsh Tritrol Co., 600 S. Michigan Ave., Chicago, Ill.
Mercoid Corp., The, 4201 Belmont Ave., Chicago, Ill.
Minneapolis-Honeywell Regulator Co., 2701 Fourth Ave., South, Minneapolis, Minn.
Penn Electric Switch Co., Box 556, Goshen, Ind.
Pierce Butler Radiator Corp., 701 Nichols Ave., Syracuse, N. Y.
Raymond Co., F. I., 629 W. Washington Blvd., Chicago, Ill.
Richmond Radiator Co., Gas Products Div., Uniontown, Pa.
Sarco Co., Inc., 183 Madison Ave., New York, N. Y.
Spence Engineering Co., Inc., 28 Grant St., Walden, N. Y.
Sterling, Inc., 3738 N. Holton St., Milwaukee, Wis.
Sullivan Valve & Engineering Co., 910 S. Arizona St., Butte, Mont.
Tallmadge & Co., Webster, 255 N. 18th St., Orange, N. J.
Thrush & Co., H. A., 21 E. Riverside Dr., Peru, Ind.
Triplex Heating Specialty Co., Inc., 131 E. Canal St., Peru, Ind.
Webster & Co., Warren, 17th & Federal Sts., Camden, N. J.

CONVECTORS

(See Radiators, Cast Iron and Radiators, Non-Ferrous Convectors)

COOLERS, WATER

Acme Industries, Inc., Cor. Mechanic and Ganson Sts., Jackson, Mich.
Baker Ice Machine Co., Inc., 1508 Evans St., Omaha, Neb.
Bell & Gossett Co., 3000 Wallace St., Chicago, Ill.
Bros Boiler & Mfg. Co., Wm., Nicollet Island, Minneapolis, Minn.
Carbondale Div., Worthington Pump & Machinery Corp., Harrison, N. J.
Croll-Reynolds Engineering Co., Inc., 17 John St., New York, N. Y.
Drayer & Hanson, Inc., 738 E. Pico Blvd., Los Angeles, Cal.
Fedders Mfg. Co., Inc., 57 Tonawanda St., Buffalo, N. Y.
Filtrine Mfg. Co., Inc., 53 Lexington Ave., Brooklyn, N. Y.
Frank Heaters Inc., 150 Railroad Ave., Paterson, N. J.
Frick Co., Waynesboro, Pa.
General Electric Co., Air Conditioning and Commercial Refrigeration Dept., 5 Lawrence St., Bloomfield, N. J.
Griscom-Russell Co., The, 285 Madison Ave., New York, N. Y.
Howe Ice Machine Co., 2825 Montrose Ave., Chicago, Ill.

YOU NEED

all three

in HEATING *and*

VENTILATING

Engineering DESIGN

Mechanical EQUIPMENT

Adequate CONTROL ★

MINNEAPOLIS-HONEYWELL

THE MODUTROL SYSTEM OF ELECTRIC CONTROL
THE GRADUTROL SYSTEM OF PNEUMATIC CONTROL
BROWN INSTRUMENTS FOR INDICATING AND RECORDING

Control SYSTEMS

Larkin Coils, Inc., 519 Memorial Dr., S. E., Atlanta, Ga.
Marlo Coil Co., 6135 Manchester Ave., St. Louis, Mo.
McQuay, Inc., 1600 Broadway, N. E., Minneapolis, Minn.
Mojonnier Bros. Co., 4601 W. Ohio St., Chicago, Ill.
Patterson-Kelley Co., Inc., East Stroudsburg, Pa.
Refrigeration Economics Co., Inc., 1232 Second St., N. E., Canton, O.
Richmond Engineering Co., Inc., 7th & Hospital Sts., Richmond, Va.
Ross Heater & Mfg. Co., Inc., 1407 West Ave., Buffalo, N. Y.
Schubert-Christy Corp., Box 166, Affton Station, St. Louis, Mo.
Schutte & Koerting Co., 12th & Thompson Sts., Philadelphia, Pa.
Sims Co., 18th & Whitley Sts., Erie, Pa.
Taco Heaters, Inc., 342 Madison Ave., New York, N. Y.
Vilter Mfg. Co., 2148 S. First St., Milwaukee, Wis.
Westinghouse Electric & Mfg. Co., Springfield, Mass.
Whitehead Metal Products Co. of New York, Inc., 303 W. 10th St., New York, N. Y.
Whitlock Mfg. Co., 100 South St., Hartford, Conn.
X L Refrigerating Co., 1834 W. 59th St., Chicago, Ill.
York Ice Machinery Corp., Roosevelt Ave., York, Pa.

COOLING TOWERS
(See Towers, Cooling)

COPPER FITTINGS
(See Fittings for Copper Tubing)

COPPER PIPE
(See Pipe, Brass and Copper)

COPPER SHEETS
(See Sheets, Copper)

COPPER TUBING
(See Tubing, Brass and Copper)

COUNTERS, DUST
Bausch & Lomb Optical Co., 635 St. Paul St., Rochester, N. Y.
Wilson Products, Inc., 348 Thorn St., Reading, Pa.

COUPLINGS, PIPE
Aluminum Co. of America, 801 Gulf Bldg., Pittsburgh, Pa.
Barco Mfg. Co., 1801 Winnemac Ave., Chicago, Ill.
Byers Co., A. M., Clark Bldg., Pittsburg, Pa.
Champion Machine & Forging Co., 3678 E. 78th St., Cleveland, O.
Clow & Sons, James B., 201-299 N. Talmon Ave., Chicago, Ill.
Colonial Alloys Co., Specialties Div., E. Somerset, Trenton Ave., and Reading R.R., Philadelphia, Pa.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Detroit Brass & Malleable Works, 100 S. Campbell, Detroit, Mich.
Devlin Mfg. Co., Inc., Thos., Burlington, N. J.
Dresser Mfg. Co., 490 Fisher Ave., Bradford, Pa.
Flagg & Co., Inc., Stanley G., 1421 Chestnut St., Philadelphia, Pa.
Grabbler Mfg. Co., 6565 Broadway, Cleveland, O.
Grinnell Co., Inc., 260 W. Exchange, Providence, R. I.
H. & B. Sales Co., Ltd., 2875 Cherry Ave., Long Beach, Cal.
Harrisburg Steel Corp., 10th & Herr Sts., Harrisburg, Pa.
Hasco Valve & Machine Co., 1819 W. St. Paul Ave., Milwaukee, Wis.
Henry Valve Co., 1019 N. Spaulding Ave., Chicago, Ill.
Illinois Malleable Iron Co., 1801 Diversey Ave., Chicago, Ill.
Jarecki Mfg. Co., 1345 W. 12th St., Erie. Pa.
Jefferson Union Co., Sales Office, 601 W. 26th St., New York, N. Y. Factory: Lexington, Mass.
Jones & Laughlin Steel Corp., Third & Ross St., Pittsburgh, Pa.
Kennedy Valve Mfg. Co., Elmira, N. Y.
King Union Co., Inc., Hillsgrove, R. I.
Malleable Iron Fittings Co., Branford, Conn.
Mueller Brass Co., Lapeer Ave., Port Huron, Mich.
National Tube Co., United States Steel Corp. Sub., Frick Bldg., Pittsburgh, Pa.
Pittsburgh Equitable Meter Co., 400 N. Lexington Ave., Pittsburgh, Pa.
Pittsburgh Valve & Fittings Corp., Barberton, O.
Semler Co., Jeannette, Pa.
Standard Auto-Tite Joint Co., 7501 Thomas Blvd., Pittsburgh, Pa.
Stockham Pipe Fittings Co., 4100 Tenth Ave, N., Birmingham, Ala.
Stokes Rubber Co., Jos., Taylor & Webster, Trenton, N. J.
Streamline Pipe & Fittings Div., Mueller Brass Co., 1925 Lapeer Ave., Port Huron, Mich.
Taylor Forge & Pipe Wks., P. O. Box 485, Chicago, Ill.
Victaulic Co. of America, 30 Rockefeller Plaza, New York, N. Y.
Walworth Co., 60 E. 42nd St., New York, N. Y.
Ward Foundries, Inc., J. P., Blossburgh, Pa.
Watson-Stillman Co., 140 Aldene Rd., Roselle, N. J.
Weatherhead Co., 300 E. 131st St., Cleveland, O.

CO_2 RECORDERS
(See Recorders, Carbon Dioxide)

DAMPER MOTORS
(See Motors, Damper-Operating)

DAMPER QUADRANTS
(See Quadrants, Damper)

DAMPERS, DUCT
Remote Controlled Type
American Warming & Ventilating Co., 1017-1021 Summit St., Toledo, O.
Au-Temp-Co Corp., 1 Park Ave., New York, N. Y.
Barber-Colman Co., 225 Loomis St., Rockford, Ill.
Brooke Engineering Co., Inc., 4517 Wayne Ave., Philadelphia, Pa.
Johnson Service Co., 507 E. Michigan St., Milwaukee, Wis.
Jordan & Co., Paul R., 631 S. Delaware St., Indianapolis, Ind.
Milcor Steel Co., S. 41st & Burnham Sts., Milwaukee, Wis.
Minneapolis - Honeywell Regulator Co., 2701 Fourth Ave., South, Minneapolis, Minn.
Parker-Kalon Corp., 200 Varick St., New York, N. Y.
Penn Electric Switch Co., Box 553, Goshen, Ind.
Powers Regulator Co., 2720 Greenview Ave., Chicago, Ill.
Richmond Radiator Co., Gas Products Div., Uniontown, Pa.
Stuart Co., W. W., 417 Ninth St., Des Moines, Ia.
Sturtevant Co., B. F., Damon St., Hyde Park, Boston, Mass.
Shallcross Controls, Inc., 121 N. Broadway, Milwaukee, Wis.
Tuttle & Bailey, Inc., Corbin Ave., New Britain, Conn.
Young Regulator Co., 4500 Euclid Ave., Cleveland, O.

DAMPERS, DUCT
Manual Type
Parker-Kalon Corp., 200 Varick St., New York, N. Y.

DEEP WELL PUMPS
(See Pumps, Deep Well)

DEHUMIDIFIERS
Absorption (AB). Adsorption (AD), Spray (S)

Air & Refrigeration Corp., 11 W. 42nd St., New York, N. Y. (AB)
American Blower Corp., 6000 Russell St., Detroit, Mich. (S)
American Injector Co., 1481-14th St., Detroit, Mich. (AB)
Ames Co. W. R., 150 Hooper St., San Francisco, Cal. (S)
Aqua-Sorb Co., 21 S. 16th St., East Orange, N. J. (AB)
Bayley Blower Co., 1817 S. 66th St., Milwaukee, Wis. (S)
Bryant Heater Co., The. 17825 St. Clair Ave., Cleveland, O. (AD)
Buffalo Forge Co., 171 Mortimer St., Buffalo, N. Y. (S)
Carrier Corp., 302 S. Geddes St., Syracuse, N. Y. (AD)
Clarage Fan Co., Porter St., Kalamazoo, Mich. (S)
Drying Systems, Inc., 1800 Foster Ave., Chicago, Ill. (S)
Gay Engineering Corp., of California, 2730 E. 11th St., Los Angeles, Cal. (S)
International Moistening Co., 489 S. Main St., Providence, R. I. (S)
Kauffman Air Conditioning Corp., 4336 W. Pine Blvd., St. Louis, Mo. (S)
King Ventilating Co., Box 178, Owatonna, Minn. (S)
Marley Co., 1915 Walnut St., Kansas City, Mo. (S)
Mellish & Murray Co., 1715 Carroll Ave., Chicago, Ill. (S)
Niagara Blower Co., 6 E. 45th St., New York, N. Y. (S)
Pittsburgh Lectrodryer Corp., Foot of 32nd St., Pittsburgh, Pa. (AD)
Research Corp., 405 Lexington Ave., New York, N. Y. (S) (AB)
Ross Engineering Corp., J. O., 350 Madison Ave., New York, N. Y. (S)
St. Louis Blow Pipe & Heater Co., 1954 N. 9th St., St. Louis, Mo. (S)
Savage Arms Corp., 100 E. 42nd St., New York, N. Y. (S)
Skinner Heating & Ventilating Co., Inc., Div. of St. Louis Blow Pipe & Heater Co., Inc., 2000 N. 9th St., St. Louis, Mo. (S)
Spray Engineering Co., 120 Central St., Somerville, Mass. (S)
Spray Wheel Air Conditioners, Inc., 1320 19th St., Denver, Colo. (S)
Steamaire Co., Cincinnati, O.
Sturtevant Co., B. F., Damon St., Hyde Park, Boston, Mass. (S)
Surface Combustion Corp., 2375 Dorr St., Toledo, O. (AD) (S)
Trane Co., The, La Crosse, Wis.
Typhoon Air Conditioning Co., 252 W. 26th St., New York, N. Y. (S)
U. S. Air Conditioning Corp., 2101 Kennedy St., N. E., Minneapolis, Minn. (S)
Western Blower Co., 1800 Airport Way, Seattle, Wash. (S)
X L Refrigerating Co., 1834 W. 59th St., Chicago, Ill. (S)
York Ice Machinery Corp., Roosevelt Ave., York, Pa. (S)

DETECTORS, LEAK
For Use With Refrigerants
Bernz Co., Inc., Otto, 280 Lyell Ave., Rochester, N. Y.
Imperial Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.
Linde Air Products Co., The, Unit of Union Carbide & Carbon Corp., 30 E. 42nd St., New York, N. Y.
Turner Brass Wks., 823-47 Park Ave., Sycamore, Ill.

DIAPHRAGM VALVES
(See Valves, Steam and Water)

DIFFUSERS, AIR
High Velocity
(See also Grilles, Registers)

Air Devices Inc., 17 E. 42nd St., New York, N. Y.
American Warming & Ventilating Co., 1017-1021 Summit St., Toledo, O.
Anemostat Corp. of America, 10 E. 39th St., New York, N. Y.
Barber-Colman Co., 225 Loomis St., Rockford, Ill.
Campbell Heating Co., E. K., 2445 Charlotte St., Kansas City, Mo
Demuth & Sons, Charles, 112-07 New York Ave., Jamaica, N. Y.
Mountain States Equipment Co., 1238 Speer Blvd., Denver, Colo.
Plandaire Inc., P. O. Box 7350, Oakland Station, Pittsburgh, Pa.
Steamaire Co., Cincinnati, O.
Tuttle & Bailey, Inc., Corbin Ave., New Britain, Conn.
Typhoon Air Conditioning Co., 252 W. 26th St., New York, N. Y.
U. S. Air Conditioning Corp., 2101 Kennedy St., N. E., Minneapolis, Minn.

DIRECT-FIRED HEATERS
(See Heaters, Air)

DOORS and PANELS
For Access
American Foundry & Furnace Co., Washington St. at McClun, Bloomington, Ill.
American Sheet Metal Works, 331 N. Alexander, New Orleans, La.
Auer Register Co., 3608 Payne Ave., Cleveland, O.
Clarage Fan Co., Porter St., Kalamazoo, Mich.
Falstrom Co., Main Ave. & D.L. & W. R. R., Passaic, N. J.
Gillian Mfg. Co., 7752 Dubois St., Detroit, Mich.
Higgin Products, Inc., Newport, Ky.
Kirk & Blum Mfg. Co., 2838-52 Spring Grove Ave., Cincinnati, O.
Lawson Co., F. H., Evans & Whately Sts., Cincinnati, O.
Milcor Steel Co., S. 41st & Burnham Sts., Milwaukee, Wis.
Patten Co., J. V., 500 De Kalb Ave., Sycamore, Ill.
Rock Island Register Co., 2435 Fifth Ave., Rock Island, Ill.
Truscon Steel Co., 1315 Albert St., Youngstown, O.
Tuttle & Bailey, Inc., Corbin Ave., New Britain, Conn.
Walsh-Spencer Co., 420 Boylston St., Boston, Mass.
Way Panel Loctor Co., Wollaston, Mass.

DRAFT GAGES
(See Gages, Pressure Indicating)

DRAFT RECORDERS
(See Recorders, Draft)

DRAFT REGULATORS
(See Regulators, Draft)

DRYING SYSTEMS
(See Systems, Drying)

DUCT CONNECTORS
(See Connectors, Duct)

DUCT DAMPERS
(See Dampers, Duct, Remote Controlled Type, and Dampers, Duct, Manual Type)

DUCT HEATERS
(See Heaters, Duct)

DUCT THERMOMETERS
(See Thermometers, Indicating)

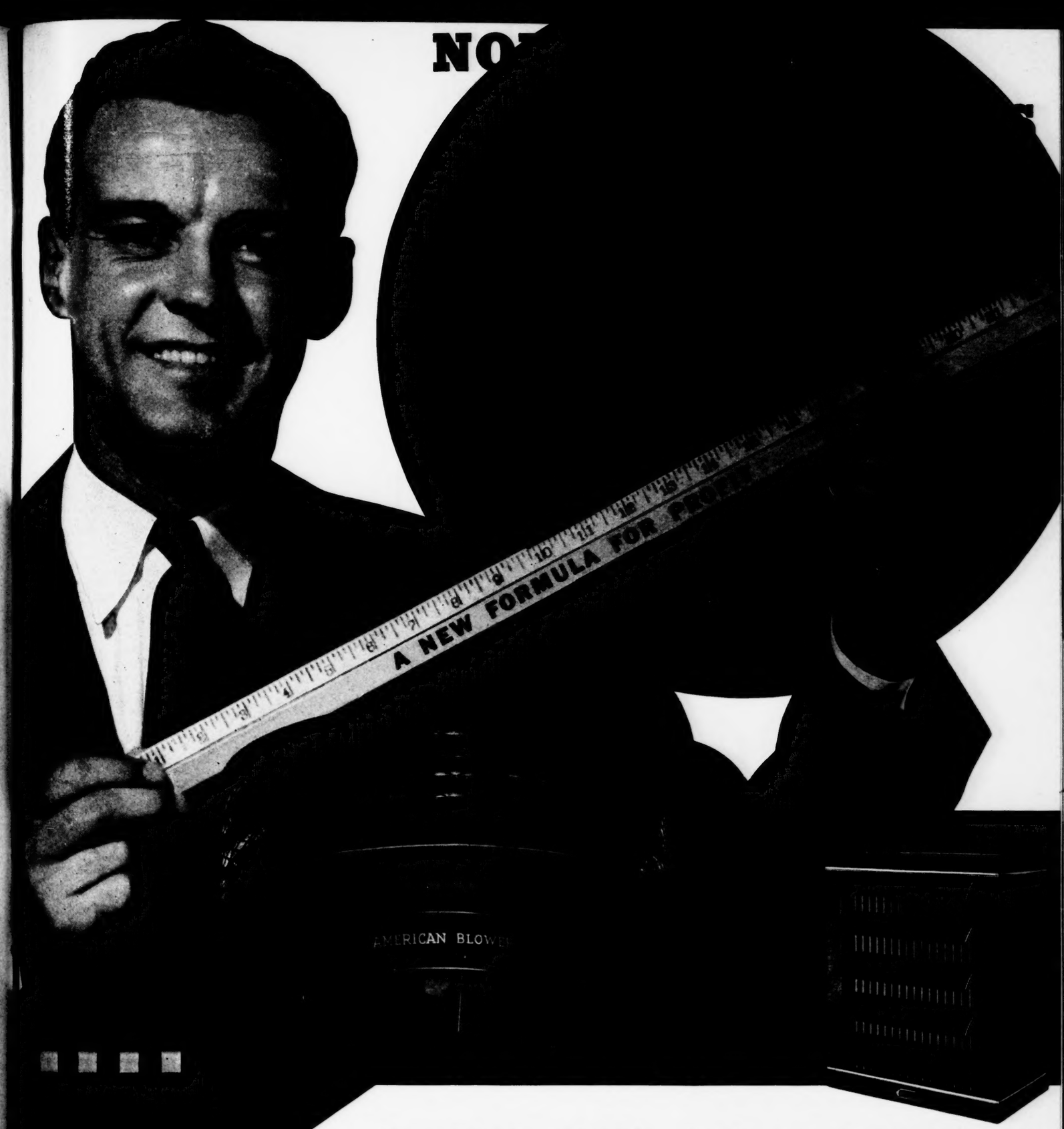
DUCT THERMOSTATS
(See Thermostats, Air Duct)

DUST COLLECTORS
(See Collectors, Dust)

DUST COUNTERS
(See Counters, Dust)

DUST SEPARATORS
(See Separators, Dust)

DUCTS and DUCT FITTINGS
Acer & Whedon, Commercial St., Medina, N. Y.



If you are looking for a new formula for profit—a new sales appeal that has real cash value—then you'd better sell Job-Measured Heating! This new slant for hard-hitting, energetic contractors is the surest, most effective means to more heating jobs, bigger profits and satisfied customers.

Now it is possible for every contractor who sells American Blower Unit Heaters to sell Job-Measured Heating. For with the new, complete American Blower line of 4 types and 106 sizes in a complete range of capacities, you can give your customers exactly the right type, size and capacity of unit for each job and each part of a job.

These units are built to highest quality standards—have certified capacity ratings—sound ratings—and are stocked in all principal cities by leading heating and piping supply jobbers.

The greatest unit heater promotion drive in history is now under way. Write today for sales plan, free literature and display stand order blanks. This is one opportunity you can't afford to pass up. Act now!

EASY TERMS . . . Through our affiliate, The Heating & Plumbing Finance Corporation

AMERICAN BLOWER
UNIT HEATERS

Accredited CONTRACTOR-DEALER

AMERICAN BLOWER CORP., 6000 Russell St., Detroit, Michigan • CANADIAN SIROCCO COMPANY, LIMITED, Windsor, Ontario

Division of American Radiator and Standard Sanitary Corporation

Acme Tin Plate & Roofing Supply Co., 3rd & Westmoreland Sts., Philadelphia, Pa.
Allen Co., E. H., 22 Dorrance St., Boston, Mass.
Carey Co., The, Philip, Wayne Ave., Lockland, Cincinnati, O.
Champion Furnace Pipe Co., 918 S. Adams St., Peoria, Ill.
Chandler Co., 804 First Ave., N. W., Cedar Rapids, Ia.
Char-Gale Mfg. Co., 3127 Hiawatha Ave., Minneapolis, Minn.
Chicago Furnace Supply Co., 1278 Clybourn Ave., Chicago, Ill.
Cincinnati Sheet Metal & Roofing Co., 230 E. Front St., Cincinnati, O.
Corbman Bros., Inc., 1205 N. Fourth St., Philadelphia, Pa.
Excelsior Steel Furnace Co., The, 118 So. Clinton St., Chicago, Ill.
Green Colonial Furnace Co., 322 S. W. Third St., Des Moines, Ia.
Haveg Corp., Newark, Del.
Henry Furnace & Foundry Co., 3480 E. 49th St., Cleveland, O.
Howes Co., S. M., 511 Medford St., Charlestown District, Boston, Mass.
Johns-Manville, 22 E. 40th St., New York, N. Y.
Lamneck Products, Inc., 905 Cremo St., Middletown, O.
Meyer & Bro. Co., F., 1313 S. Adams St., Peoria, Ill.
Milcor Steel Co., S. 41st & Burnham Sts., Milwaukee, Wis.
Moncrief Furnace Co., P. O. Box 1673, Atlanta, Ga.
Mueller Furnace Co., L. J., 2005 W. Oklahoma Ave., Milwaukee, Wis.
Norman Sheet Metal Mfg. Co., 212-236 N. Cedar St., Nevada, Mo.
Patten Co., J. V., 500 De Kalb Ave., Sycamore, Ill.
Richmond Radiator Co., Gas Products Div., Uniontown, Pa.
Strandwitz & Co., Inc., W. J., Jefferson and Master Sts., Camden, N. J.
Sturtevant Co., B. F., Damon St., Hyde Park, Boston, Mass.
United States Register Co., Burnham St., Battle Creek, Mich.
Williamson Heater Co., 337 W. Fifth St., Cincinnati, O.

ECONOMIZERS, FLUE GAS

Babcock & Wilcox Co., 85 Liberty St., New York, N. Y.
Bros Boiler & Mfg. Co., Wm., Nicollet Island, Minneapolis, Minn.
Campbell Heating Co., E. K., 2445 Charlotte St., Kansas City, Mo.
Combustion Engrg. Co., Inc., 206 Madison Ave., New York, N. Y.
Condensation Engrg. Co., 2515 Archer Ave., Chicago, Ill.
Edge Moor Iron Works, 30 Rockefeller Plaza, New York, N. Y.
Foster Wheeler Corp., 165 Broadway, New York, N. Y.
Green Fuel Economizer Co., 637 Main St., Beacon, N. Y.
General Oil Burner Corp., 1623 Asquith St., Baltimore, Md.
Heilman Boiler Works, Allentown, Pa.
Keeler, E., Co., 238 West St., Williamsport, Pa.
Richmond Engrg. Co., 7th & Hospital Sts., Richmond, Va.
Riley Stoker Corp., 999 Neponset St., Worcester, Mass.
Steam Saver Corp., 231 S. La Salle St., Chicago, Ill.
Sturtevant, B F., Co., Damon St., Hyde Park. Boston, Mass.
Union Iron Works, 1500 Cascade St., Erie, Pa.
Wickes Boiler Co., 512 N. Water St., Saginaw, Mich.

EJECTORS, STEAM

(See also Pumps, Steam Jet)

Allen - Sherman - Hoff Co., Lewis Tower Bldg., Philadelphia, Pa.
American Injector Co., 1481 14th St., Detroit, Mich.
Chaplin-Fulton Mfg. Co., 28-40 Penn Ave., Pittsburgh, Pa.
Croll-Reynolds Engineering Co., Inc., 17 John St., New York, N. Y.
Duriron Co., Inc., Box 1019, Dayton, O.
Economy Pumps, Inc., 1000 Weller Ave., Hamilton, O.
Elliott Co., Jeannette, Pa.
Foster Wheeler Corp., 165 Broadway, New York, N. Y.
Haveg Corp., Newark, Del.
Ingersoll-Rand Co., 11 Broadway, New York, N. Y.
Jarecki Mfg. Co., Erie, Pa.
Kincaid Bros., 211 Water St., Pittsburgh, Pa.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Murdock Mfg. & Supply Co., 426 Plum St., Cincinnati, O.
Nathan Mfg. Co., 250 Park Ave., New York, N. Y.
Ohio Injector Co., Wadsworth, O.
Penberthy Injector Co., 1242 Holden Ave., Detroit, Mich.
Perkins, B. F., & Son, Inc., Holyoke, Mass.
Quimby Pump Co., Inc., 339 Thomas St., Newark, N. J.
Ross Heater & Mfg. Co., Inc., 1407 West Ave., Buffalo, N. Y.
Schutte & Koerting Co., 1165 Thompson St., Philadelphia, Pa.
Sterling Pump Corp., Hamilton, O.
Watson & McDaniel Co., N. W. Cor. Marshall & Noble Sts., Philadelphia, Pa.
Weil Pump Co., 215 W. Superior St., Chicago, Ill.
Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.

EJECTORS, SEWERAGE

American-Marsh Pumps, Inc., 100 Capital Ave., N. E., Battle Creek, Mich.
Chicago Pump Co., 2325 Wolfram St., Chicago, Ill.
Columbus Steam Pump Works Co., 724 W. Gay St., Columbus, O.
Economy Pumps, Inc., 2522 W. Congress St., Chicago, Ill.
Nash Engineering Co., South Norwalk, Conn.
Penberthy Injector Co., 1242 Holden Ave., Detroit, Mich.
Quimby Pump Co., Inc., 340 Thomas St., Newark, N. J.
Taber Pump Co., Inc., 272 Elm St., Buffalo. N. Y.
Weil Pump Co., 215-17 W. Superior St., Chicago, Ill.
Yeomans Bros. Co., 1433 N. Dayton St., Chicago, Ill.

ELECTRIC MOTORS

(See Motors, Electric)

ELECTRIC RADIATORS

(See Radiators, Electric-Steam)

ENGINES, DRIVING

Diesel (D). Gas (G). and Steam (S)

Allis-Chalmers Mfg. Co., 1126 S. 70th St., Milwaukee, Wis. (S)
American Locomotive Co., Diesel Engine Div., Auburn, N. Y. (D)
Ames Iron Wks., Div. of Pierce Butler Radiator Corp., Oswego, N. Y. (S)
Anderson Engine & Foundry Co., 6245 State Rd., Philadelphia, Pa.
Bardco Corp. of America, 6670 Lexington Ave., Los Angeles, Cal. (G)
Buda Co., Harvey, Ill. (D)
Caterpillar Tractor Co., 600 W. Washington St., Peoria, Ill. (D) (G)
Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y. (D) (G)
Continental Motors Corp., Muskegon, Mich. (G)
Elliott Co., Jeannette, Pa. (S)
Fairbanks, Morse & Co., 600 Michigan Ave., Chicago, Ill. (D) (G)
Frick Co., W. Main St., Waynesboro, Pa. (S)
General Motors Corp., Detroit, Mich. (D)
Harrisburg Fdry. & Mach. Co., Inc., 7th & Curtin St., Harrisburg, Pa. (S)
Hill Diesel Engine Co., Lansing, Mich. (D)
Ingersoll-Rand, 11 Broadway, New York, N. Y. (D) (G)
Lycoming Mfg. Co., Williamsport, Pa. (G)
Morris Machine Wks., 50 E. Genesee St., Baldwinsville, N. Y. (S)
Murray Iron Wks. Co., 1106 Washington St., Burlington, Ia. (S)
Pierce, Butler Radiator Corp., 701 Nicholas Ave., Syracuse, N. Y. (S)
Skinner Engine Co., 337 W. 12th St., Erie, Pa. (S)
Sturtevant Co., B. F., Damon St., Hyde Park, Boston, Mass. (S)
Troy Engine & Machine Co., 184 Railroad Ave., Troy, Pa. (S)
U. S. Motors Corp., 420 Nebraska St., Oshkosh, Wis. (G)
Universal Motor Co., 323 Universal Ave., Oshkosh, Wis. (G)
Vilter Mfg. Co., 2148 S. First St., Milwaukee, Wis. (S)
Waukesha Motor Co., Waukesha, Wis. (D) (G)
Worthington Pump & Machinery Corp., Harrison, N. J. (D) (G) (S)

EVAPORATIVE COOLERS

(See Condensers, Refrigerant, Evaporative and also Air Conditioners, Evaporative Cooling Type)

EXPANSION JOINTS

(See Joints, Pipe Expansion)

EXPANSION TANKS

(See Tanks, Metal, Hot Water Expansion)

FAN BLADES

(See Blades)

FANS, VENTILATING

Centrifugal (C) and Propeller (P)

Advance Aluminum Castings Corp., 2742 W. 36th Pl., Chicago, Ill. (C)
Advance Fan & Blower Co., 3428 Bagley, Detroit, Mich.
Aerovent Fan Co., 710 E. Ash St., Piqua, O. (P)
Air Controls, Inc., 9205 Detroit Ave., Cleveland, O. (C) (P)
Aircraft Mfg. Co., 418 E. First St., Dayton, O. (P)
Aire-Foile Fan & Blower Co., 4737 W. Vernor Highway, Detroit, Mich. (P)
Airmaster Corp., 4317 Ravenswood Ave., Chicago, Ill. (P)
Air-O-Line Co., The, 1101-1107 McKinney, Dallas, Tex.
Airtherm Mfg. Co., 700 S. Spring Ave., St. Louis, Mo. (C) (P)
Allen Billmyre Corp., 218 News Bldg., New York, N. Y. (C)
Allen Co., E. H., 22 Dorrance St., Boston, Mass.
Allen Corp., 9767 Erwin Ave., Detroit, Mich. (P)
American Blower Corp., 6000 Russell St., Detroit, Mich. (P) (C)
American Coolair Corp., 3604 Mayflower St., Jacksonville, Fla. (P)
American Foundry & Furnace Co., Washington St. at McClun, Bloomington, Ill. (C)
Ames Co., W. R., 150 Hooper St., San Francisco, Cal. (C)
Atlas Heating & Ventilating Co., Ltd., 557 Fourth St., San Francisco, Cal. (C)
Autovent Fan & Blower Co., 1811-27 N. Kostner Ave., Chicago, Ill. (C) (P)
Ballantyne Co., 222 N. 16th St., Omaha, Nebr. (C)
Bayley Blower Co., 1817 S. 66th St., Milwaukee, Wis. (C) (P)
Belanger Fan & Blower Co., 1230 18th St., Detroit, Mich.
Belco Exhaust Fan Mfg. Co., 3810 Olive St., St. Louis, Mo. (P)
Berns Specialty Co., 1015 Lake St., Chicago, Ill. (C) (P)
Bishop & Babcock Mfg. Co., 4901 Hamilton Ave., Cleveland, O. (C) (P)
Blower Application Co., 918 N. Fourth St., Milwaukee, Wis. (C)
Brundage Co., 514 N. Park St., Kalamazoo, Mich. (C)
Buffalo Forge Co., 171 Mortimer St., Buffalo, N. Y. (C) (P)
Campbell Heating Co., 31st & Dean, Des Moines, Ia. (C)
Campbell Heating Co., E. K., 2445 Charlotte St., Kansas City, Mo.
Carrier Corp., 302 S. Geddes St., Syracuse, N. Y.
Champion Blower & Forge Co., Harrisburg Ave. and Charlotte St., Lancaster, Pa. (C) (P)
Chelsea Fan & Blower Co., 370 W. 15th St., New York, N. Y. (P)
Circulators & Devices Mfg. Corp., 100 Prince St., New York, N. Y. (P)
Clarage Fan Co., Porter St., Kalamazoo, Mich. (C) (P)
Columbus Heating & Ventilating Co., 182 N. Yale Ave., Columbus, O. (C)
Coppus Engineering Corp., 374 Park Ave., Worcester, Mass. (C) (P)
Dallas Engineering Co., Inc., 1115 Hall, Dallas, Tex. (P)
DeBothezat Ventilating Equipment Div., American Machine & Metals, Inc., East Moline, Ill. (C) (P)
Diehl Mfg. Co., Trumbull St., Elizabethport, N. J. (P)
Duriron Co., Inc., 450 N. Findlay St., Dayton, O. (Acid resisting). (C)
Eclipse Fuel Engineering Co., 707 S. Main St., Rockford, Ill. (C)
Economy Electric Mfg. Co., 4606 W. 26th Pl., Chicago, Ill. (C) (P)
Electrovent Fan & Mfg. Co., 812 W. Lake St., Chicago, Ill. (C) (P)
Emerson Electric Mfg. Co., 1847 Washington Ave., St. Louis, Mo. (P)
Forker Corp., 3005 E. 55th St., Cleveland, O.
Furblo Co., Hermansville, Mich. (C)
Fresh'nd-Aire Co., 2626 W. Washington Blvd., Chicago, Ill. (P)
Garden City Fan Co., Inc., 332 S. Michigan Ave., Philadelphia, Pa. (C) (P)
Gas City Glass Co., Gas City, Ind. (P)
General Blower Co., Inc., 2402 Market St., Philadelphia, Pa. (C) (P)
General Electric Co., Air Conditioning and Commercial Refrigeration Dept., 5 Lawrence St., Bloomfield, N. J. (P)
General Regulator Corp., 2608 Arthington St., Chicago, Ill. (P)
Governair Corp., 605 W. Main St., Oklahoma City, Okla. (P)
Grand Rapids Blow Pipe & Dust Arrester Co., 525-28 Monroe Ave., Grand Rapids, Mich. (P)
Grand Rapids Die & Tool Co., 325 Scribner Ave., N. W., Grand Rapids, Mich. (C)
Green Fuel Economizer Co., Inc., Beacon, N. Y. (C)
Hall Mfg. Co., Cedar Rapids, Ia. (P)
Hartzell Propeller Fan Co., P. O. Box 909, Roosevelt Ave., Piqua, O. (P)
Hastings Air Conditioning Co., Inc., Box 481, 615 W. South St., Hastings, Nebr. (C)
Heilman Boiler Works, Allentown, Pa. (C) (P)
Hirschman Co., W. F., 1245 McKinley Parkway, Buffalo, N. Y. (C) (P)
Hudson Equipment Corp., 324 Third Ave., N., Minneapolis, Minn. (P)
Ilg Electric Ventilating Co., 2850 N. Crawford Ave., Chicago, Ill. (C) (P)
International Engineering, Inc., 1145 Bolander Ave., Dayton, O. (P)
Jaden Mfg. Co., F., Golden Rod Products, Hastings, Nebr. (C)
Janette Mfg. Co., 556 W. Monroe St., Chicago, Ill. (C)
Johnson Fan & Blower Corp., 1320 W. Lake St., Chicago, Ill. (C) (P)
Jordan & Co., Paul R., 631 S. Delaware St., Indianapolis, Ind. (P)
King Ventilating Co., Box 178, Owatonna, Minn. (C) (P)
Kisco Co., Inc., 39th and Chouteau Ave., St. Louis, Mo. (P)
Lau Blower Co., 2001 Home Ave., Dayton, O. (C) (P)
Lehigh Fan & Blower Co., Front & Linden Sts., Allentown, Pa. (C)

BADGER EXPANSION JOINTS

WHY THEY'RE THE BEST BUY

PACKLESS

HEAT-TREATED

DIRECTED FLEXING

STAINLESS STEEL *as well as* SPECIAL COPPER

CLOSE TRAVERSE SELECTIVITY

EXPERIENCED

Six Good Reasons for You to Buy Badger Joints

★ Packless to save you money in maintenance.

★ Heat-treated the Badger way to give you a joint with its metal prepared properly for fabrication and which has had fabrication strains and stresses practically removed, resulting in a more durable flexing unit.

★ Directed Flexing, which is the most descriptive term that can be given to the function of the Badger corrugation and the corresponding rings in the self-equalizing joint. The flexing movement is definitely directed as well as limited. Result: flexing stresses are kept distributed instead of tending to localize, an advantage not to be expected in joints with old-style, straight-sided corrugations.

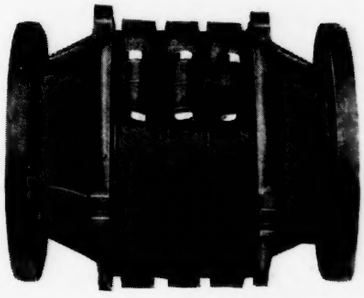
★ Stainless Steel for the higher temperatures, pressures, and corrosion—a self-explanatory feature.

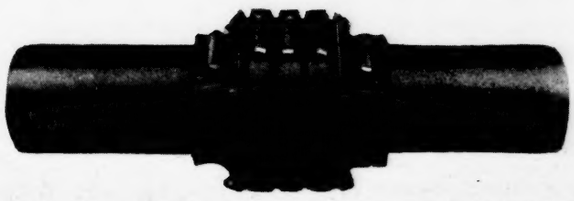
★ Close Traverse Selectivity which enables you to buy a joint which has a safe excess traverse but not an excess that cannot be used.

★ Experienced Joints. It stands to reason that expansion joints which have been on the market more than forty years are experienced. It also stands to reason that the company manufacturing such joints has a broader knowledge of expansion and contraction problems and how to solve them.

Yes, these are six good and sufficient reasons for you to buy Badger Expansion Joints!

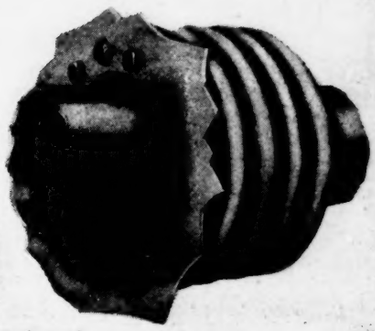
E. B. BADGER & SONS CO.
75 Pitts St., Boston, Mass.
Agents in Principal Cities





Directed Flexing, Self-Equalizing Expansion Joints (at left) showing flanged end and welding end types. Bulletin 100 gives full details.

Non-Equalizing Expansion Joint (left) for low pressure, short traverse movements; also for absorbing vibrations between equipment and pipeline. Bulletin 200. Flexible Pipeline Seal (below) for making watertight seals where pipelines pass through walls or foundations while allowing for expansion and contraction.



Lohman, Inc., Wm. J., 62 Ninth Ave., New York, N. Y. (P)
Magirl Foundry & Furnace Works, P. H., 401-413 E. Oakland Ave., Bloomington, Ill. (C)
Majestic Co., 733 Erie St., Huntington, Ind. (P)
Marathon Electric Mfg. Corp., 131 W. Washington St., Wausau, Wis. (P)
Meier Electric & Machine Co., 3525 E. Washington St., Indianapolis, Ind. (P)
Metal Stamping & Mfg. Co., The, E. 168th St. and Waterloo Rd., Cleveland, O. (C) (P)
Montag Stove & Furnace Wks., 2011 N. Columbia Blvd., Portland, Ore. (C)
Morrison Products Inc., E. 168th St. & Waterloo Rd., Cleveland, O.
Mountain States Equipment Co., 1238 Speer Blvd., Denver, Colo. (P)
Myers Electric Co., 410 Third Ave., Pittsburgh, Pa. (P)
National Standard Air Products Co., 325 W. Huron St., Chicago, Ill. (P)
New York Blower Co., 3155 Shields Ave., Chicago, Ill. (C) (P)
Niagara Blower Co., 6 E. 45th St., New York, N. Y. (C) (P)
Northern Blower Co., 6409 Barberton Ave., Cleveland, O. (C)
Palmer Mfg. Corp., Phoenix, Ariz. (C)
Peerless Electric Co., 3021 W. Market St., Warren, O. (Disc) (C) (P)
Perkins & Son, Inc., B. F., Chicopee St., Holyoke, Mass. (P)
Phelps Mfg. Co., 801 Thomas St., Little Rock, Ark. (C) (P)
Propellair, Inc., 1345 Lagonda Ave., Springfield, O. (P)
Reed Unit-Fans, Inc., 811 St. Charles St., New Orleans, La. (P)
Reynolds Electric Co., 2650 W. Congress, Chicago, Ill. (P)
Reynolds Manufacturing Co., 412 Prospect Ave., N. E., Grand Rapids, Mich.
Robbins & Myers, Inc., Lagonda Ave., Springfield, O. (P)
Russell Co., F. C., 6535 Euclid Ave., Cleveland, O. (P)
Schwitzer-Cummins Co., Fan St., Indianapolis, Ind. (C) (P)
Signal Electric Mfg. Co., Menominee, Mich. (P)
Smith Heater Co., Peter, 6909 Hamilton St., Detroit, Mich. (C)
Smith Mfg. Co., 187 N. Water St., Rochester, N. Y. (P)
South Bend Air Products Corp., 304 E. Colfax Ave., South Bend, Ind. (P)
Spray-Wheel Air Conditioners, Inc., 1320 Nineteenth St., Denver, Colo. (C)
Star Radiator Co., 649 Ceres Ave., Los Angeles, Cal. (C)
Steamaire Co., Cincinnati, O.
Stokermatic Co., The, 1415 S. State St., Salt Lake City, Utah.
Sturtevant Co., B. F., Damon St., Hyde Park, Boston, Mass. (C) (P)
Supreme Heater & Ventilating Corp., 1911 N. Market St., St. Louis, Mo. (C)
Todd Air Conditioning Co., Inc., Bonner Springs, Kans. (C)
Torrington Mfg. Co., 70 Franklin St., Torrington, Conn. (C) (P)
Trane Co., The, LaCrosse, Wis. (C)
U. S. Air Conditioning Corp., 2101 Kennedy St., N. E., Minneapolis, Minn. (C) (P)
Universal Blower Co., 124 S. Woodward Ave., Birmingham, Mich. (P)
Utility Fan Corp., 2528 Santa Fe Ave., Los Angeles, Cal. (C) (P)
Victor Electric Products, Inc., 737 Reading Rd., Cincinnati, O. (C) (P)
Viking Air Conditioning Corp., 9500 Richmond Ave., Cleveland, O. (P)
Wagner Electric Corp., 6400 Plymouth Ave., St. Louis, Mo. (C)
Western Blower Co., 1800 Airport Way, Seattle, Wash. (C) (P)
Western Engineering & Mfg. Co., 1726 E. Washington Blvd., Los Angeles, Cal. (P)
Wing Mfg. Co., L. J., 158 W. 14th St., New York, N. Y. (C) (P)

FANS, NIGHT COOLING

Air Controls, Inc., 9205 Detroit Ave., Cleveland, O.
Aire-Foile Fan & Blower Co., 4737 W. Verner Highway, Detroit, Mich.
Airmaster Corp., 4317 Ravenswood Ave., Chicago, Ill.
Air-O-Line Co., The, 1101-1107 McKinney, Dallas, Tex.
Allen Co., E. H., 22 Dorrance St., Boston, Mass.
Allen Corporation, 9752 Erwin, Detroit, Mich.
American Blower Corp., 6000 Russell St., Detroit, Mich.
American Coolair Corp., 3604 Mayflower St., Jacksonville, Fla.
Autovent Fan & Blower Co., 1807-19 Kostner Ave., Chicago, Ill.
Belanger Fan & Blower Co., 2230 18th St., Detroit, Mich.
Belco Exhaust Fan Mfg. Co., 3810 Olive St., St. Louis, Mo.
Birmingham Fan Mfg. Co., Birmingham, Ala.
Bryant Heater Co., 17825 St. Clair Ave., Cleveland, O.
Buffalo Forge Co., 171 Mortimer St., Buffalo, N. Y.
Burnham Boiler Corp., Main St., Irvington, N. Y.
Chelsea Fan & Blower Co., Inc., 370 W. 15th St., New York, N. Y.
Circulators & Devices Mfg. Corp., 100 Prince St., New York, N. Y.
Dallas Engineering Co., Inc., 1115 Hall, Dallas, Tex.
Diehl Mfg. Co., Trumbull St., Elizabethport, N. J.
Economy Electric Mfg. 4634 W. 21st Pl., Cicero, Ill.
Electrovent Fan & Mfg. Co., 812 W. Lake St., Chicago, Ill.
Emerson Electric Mfg. Co., 1843 Washington Ave., St. Louis, Mo.
Forker Corporation, 3005 E. 55th St., Cleveland, O.
Fresh'nd-Aire Co., 2626 Washington Blvd., Chicago, Ill.
General Blower Co., 2402 Market St., Philadelphia, Pa.
General Electric Co., Air Conditioning & Commercial Ref. Dept., Bloomfield, N. J.
General Regulator Corp., 2608 Arthington St., Chicago, Ill.
Governair Corp., 605 W. Main St., Oklahoma City, Okla.
Hall Mfg. Co., Cedar Rapids, Ia.
Hartzell Propeller Fan Co., 1025 Roosevelt Ave., Piqua, O.
Hastings Air Conditioning Co., Inc., Box 481, 615 W. South St., Hastings, Nebr.
Hirschman Co., Inc., W. F., 220 Delaware Ave., Buffalo, N. Y.
Ilg Electric Ventilating Co., 2850 N. Crawford Ave., Chicago, Ill.
International Engineering, Inc., 1145 Bolander, Dayton, O.
Iona Ventilator Co., Inc., 2821-29 W. Dauphin St., Philadelphia, Pa.
Jaden Mfg. Co., F., Golden Rod Products, Hastings, Nebr.
Johnson Fan & Blower Corp., 1319 W. Lake St., Chicago, Ill.
Jordan & Co., Paul R., 630 S. Delaware St., Indianapolis, Ind.
King Ventilating Co., Box 178, Owatonna, Minn.
Kisco Company, Inc., 39th & Chouteau Ave., St. Louis, Mo.
Lau Blower Co., Home & Orchard Ave., Dayton, O.
Lohman, Inc., William J., 62 Ninth Ave., New York, N. Y.
Marathon Electric Mfg. Corp., 131 W. Washington St., Wausau, Wis.
Meier Electric & Machine Co., 3525 E. Washington St., Indianapolis, Ind.
National Standard Air Products Co., 325 W. Huron St., Chicago, Ill.
New York Blower Co., 3155 Shields Ave., Chicago, Ill.
Norman Sheet Metal Mfg. Co., W. F., 212-236 N. Cedar St., Nevada, Mo.
Palmer Mfg. Corp., Phoenix, Ariz.
Peerless Electric Co., 2000 W. Market St., Warren, O.
Philadelphia Machinery Co., 118 N. 6th St., Philadelphia, Pa.
Propellair, Inc., 1345 Lagonda Ave., Springfield, O.
Reed Unit-Fans, Inc., 811 St. Charles St., New Orleans, La.
Reynolds Electric Co., 2650 W. Congress St., Chicago, Ill.
Robbins & Myers, Inc., 1345 Lagonda Ave., Springfield, O.
Russell Co., F. C., 6535 Euclid Ave., Cleveland, O.
Schwitzer-Cummins Co., 1128 E. 10th St., Indianapolis, Ind.
Shreveport Engineering Co., Inc., 1241 Dalzell St., Shreveport, La.
Silent Sioux Oil Burner Corp., Orange City, Ia.
South Bend Air Products, Inc., 322 E. Colfax, South Bend, Ind.
Stokermatic Co., The, 1415 S. State St., Salt Lake City, Utah.
Sturtevant Co., B. F., Damon St., Hyde Park, Boston, Mass.
Todd Air Conditioning Co., Inc., Bonner Springs, Kas.
Torrington Mfg. Co., 70 Franklin St., Torrington, Conn.
U. S. Air Conditioning Corp., 2101 Kennedy St., N. E., Minneapolis, Minn.
U. S. Machine Corp., Lebanon, Ind.
Universal Blower Co., 124 S. Woodward Ave., Birmingham, Mich.
Utility Fan Corp., 2528 Santa Fe Ave., Los Angeles, Cal.
Victor Electric Products, Inc., 2950 Robertson Rd., Cincinnati, O.
Viking Air Conditioning Corp., 9500 Richmond Ave., Cleveland, O.
Wagner Electric Corp., 6400 Plymouth Ave., St. Louis, Mo.
Western Blower Co., 1800 Airport Way, Seattle, Wash.
Wood Industries, Inc., Gar, 7924 Riopelle St., Detroit, Mich.

FAN WHEELS

(See Wheels, Blower)

FEEDERS, BOILER

Automatic

American-Marsh Pumps, Inc., 100 Capital Ave., N. E., Battle Creek, Mich.
Beaton & Cadwell Mfg. Co., 185 Main St., New Britain, Conn.
Cissell Mfg. Co., W. M., 831 S. First St., Louisville, Ky.
Davis Regulator Co., 2546 S. Washtenaw Ave., Chicago, Ill.
Eclipse Fuel Engineering Co., 707 S. Main St., Rockford, Ill.
Healy Ruff Co., 765 Hampden Ave., St. Paul, Minn.
Johnson Corp., 830 Wood St., Three Rivers, Mich.
Kieley & Mueller, Inc., 40 W. 13th St., New York, N. Y.
Kisco Boiler & Engineering Co., 3732 Chouteau Ave., St. Louis, Mo.
Maid-O-Mist, Inc., 215 N. Aberdeen St., Chicago, Ill.
McAlear Mfg. Co., 1901-1909 S. Western Ave., Chicago, Ill.
McDonnell & Miller, 400 N. Michigan Ave., Chicago, Ill.
Mears-Kane-Ofeldt, Inc., 1903-1915 E. Hagert St., Philadelphia, Pa.
Mueller Steam Specialty Co., Inc., 40-20 22nd St., Long Island City, N. Y.
Nason Co., 1050 Mt. Elliott Ave., Detroit, Mich.
Schaub Engineering Co., Fred H., 325 W. Huron St., Chicago, Ill.
Schutte & Koerting Co., 12th & Thompson Sts., Philadelphia, Pa.
Sterling Engineering & Mfg. Corp., 117 Business St., Hyde Park, Mass.
Sterling, Inc., 3738 N. Holton St., Milwaukee, Wis.
Strong, Carlisle & Hammond Co., The, 1392 W. Third St., Cleveland, O.
Watts Regulator Co., 10 Embankment St., Lawrence, Mass.
Webster & Co., Warren, 17th & Federal Sts., Camden, N. J.
Wright-Austin Co., 315 W. Woodbridge St., Detroit, Mich.

FILTERS, AIR

Automatic

Air & Refrigeration Corp., 11 W. 42nd St., New York, N. Y.
Airstream Filter Corp., 2100 Washington Ave., St. Louis, Mo.
American Air Filter Co., Inc., 107 Central Ave., Louisville, Ky.
Coppus Engineering Corp., 374 Park Ave., Worcester, Mass.
Dracco Corp., 4057 E. 116th St., Cleveland, O.
Northern Blower Co., 6409 Barberton Ave., Cleveland, O.
Research Products Corp., 1011-1015 E. Washington Ave., Madison, Wis.
Staynew Filter Corp., 25 Leighton Ave., Rochester, N. Y.
Steamaire Co., Cincinnati, O.
Trerice Co., H. O., 1420 W. Lafayette Blvd., Detroit, Mich.

FILTERS

Electric Precipitation

American Air Filter Co., Inc., 107 Central Ave., Louisville, Ky.
Pangborn Corp., Pangborn Blvd., Hagerstown, Md.
Westinghouse Electric & Mfg. Co., Cleveland, O.

FILTERS, AIR, UNIT

Cleanable (C) and Throwaway (T)

Air-Maze Corp., 5200 Harvard Ave., Cleveland, O. (C)
American Air Filter Co., Inc., 107 Central Ave., Louisville, Ky. (C) (T)
American Foundry & Furnace Co., Washington St. at McClun, Bloomington, Ill. (C)
Amirton Co., 60 E. 42nd St., New York, N. Y. (C) (T)
Anderson Products, Inc., 17 Tudor St., Cambridge, Mass. (T)
Annis Air Filters, 1515 Gardena St., Glendale, Cal. (C)
Blocksom & Co., E. 5th St., Michigan City, Ind. (T)
Chicago Filter Co., Joilet, Ill. (C) (T)
Coppus Engineering Corp., 374 Park Ave., Worcester, Mass. (C)
Davies Air Filter Corp., 390 Fourth Ave., New York, N. Y. (C) (T)
Detroit Lubricator Co., 5900 Trumbull Ave., Detroit, Mich. (T)
Gehri Co., 1117 Tacoma Ave., Tacoma, Wash. (T)
Hugo Mfg. Co., 49th Ave., W., & Superior St., West Duluth, Minn. (C)
Kleenair Corp., 409 Jefferson St., Stevens Point, Wis. (C) (T)
Kraissl Co., Inc., The, Terhune and Williams Aves., Hackensack, N. J. (C)
Majestic Co., 733 Erie St., Huntington, Ind. (T)
Mueller Furnace Co., L. J., 2005 W. Oklahoma Ave., Milwaukee, Wis. (T)
Owens-Corning Fiberglas Corp., Nicholas Bldg., Toledo, O. (T)
Plymouth Cordage Co., Court St., N. Plymouth, Mass.; Anderson Products, Inc., Cambridge, Mass., National Sales Agents. (T)
Research Products Corp., 1011-1015 E. Washington Ave., Madison, Wis. (T)
Ruemelin Mfg. Co., 3920 N. Palmer St., Milwaukee, Wis. (C)
Simmons Co., Gordon H., 926 Cass St., Milwaukee, Wis.
Somers, Inc., H. J., 6063 Wabash Ave., Detroit, Mich. (C)
Staynew Filter Corp., 25 Leighton Ave., Rochester, N. Y. (C) (T)
Steamaire Co., Cincinnati, O.
Supreme Air Filter Co., 126 W. 21st St., New York, N. Y. (C)
Tuttle Air Filter Co., Inc., 1014 W. Main St., Louisville, Ky. (C)
Universal Air Filter Corp., 332 W. Michigan St., Duluth, Minn. (C)
Wilson & Co., Inc., 4100 S. Ashland Ave., Chicago, Ill. (T)

FILTER BLOWER UNITS

(See Blower-Filter Units)

FITTINGS

Blow Pipe

Acer & Whedon, Inc., Commercial St., Medina, N. Y.
Airtherm Mfg. Co., 700 S. Spring Ave., St. Louis, Mo.
Allen Co., E. H., 22 Dorrance St., Boston, Mass.
Chicago Metal Mfg. Co., 3720 S. Rockwell St., Chicago, Ill.

Satisfactory
AIR CONDITIONING
REQUIRES GOOD FILTERS
Because air conditioning engineers recognize the importance of adequate cleaning at a minimum of expense and attention, American Air Filters have become the standard for air conditioning service.
AAF offers a complete line of filters engineered to meet every air cleaning requirement. Engineering data and bulletins as well as specific information on any air cleaning problem will be furnished by our Engineering Depart
AMERICAN AIR FILTER CO.
LOUISVILLE

The Symbol of Clean Air

AAF

DUST CONTROL — AIR FILTRATION

Cincinnati Sheet Metal & Roofing Co., 230 E. Front St., Cincinnati, O.
Day Co., The, 2938 Pillsbury Ave., Minneapolis, Minn.
Falstrom Co., Main Ave., & D. L. & W. R. R., Passaic, N. J.
Goethel Co., Alfred C., 2337 N. 31st St., Milwaukee, Wis.
Goethel Sheet Metal Works, Alfred, 1912 N. Killian Pl., Milwaukee, Wis.
Grand Rapids Blow Pipe & Dust Arrester Co., 525 Monroe Ave., Grand Rapids, Mich.
Industrial Sheet Metal Works, Inc., 628 E. Forest Ave., Detroit, Mich.
Kirk & Blum Mfg. Co., 2850 Spring Grove Ave., Cincinnati, O.
Lee & Son Co., Thomas, 128-132 W. Second St., Cincinnati, O.
Mahon Co., R. C., 8650 Mt. Elliott Ave., Detroit, Mich.
Meyer & Bro. Co., F., 1311-13 S. Adams St., Peoria, Ill.
Naylor Pipe Co., 1251 E. 92nd St., Chicago, Ill.
Norman Sheet Metal Mfg. Co., 212-236 N. Cedar St., Nevada, Mo.
Northern Blower Co., 6409 Barberton Ave., Cleveland, O.
Puhl & Hepper Mfg. Co., Inc., 6400 W. Florissant Ave., St. Louis, Mo.
Tiffin Art Metal Co., Broad and Second Ave., Tiffin, O.
United States Register Co., Burnham St., Battle Creek, Mich.
Western Blower Co., 1800 Airport Way, Seattle, Wash.
Young & Bertke Co., 1004-1014 Hulbert Ave., Cincinnati, O.

FITTINGS
For Copper Tubing
Compression (C), Solder (S) and Braze (B)

American Brass Co., 414 Meadow St., Waterbury, Conn. (C) (S)
American Radiator & Standard Sanitary Corp., Bessemer Bldg., Pittsburgh, Pa.
Bell & Gossett Co., 3000 Wallace St., Chicago, Ill. (S)
Chase Brass & Copper Co., 236 Grand St., Waterbury, Conn. (C) (S)
Crane Co., 836 S. Michigan Ave., Chicago, Ill. (C) (S) (B)
Dole Valve Co., 1901-41 Carroll Ave., Chicago, Ill. (C)
Flagg & Co., Inc., Stanley G., 1421 Chestnut St., Philadelphia, Pa. (S) (B)
Grabler Mfg. Co., 6565 Broadway, Cleveland, O. (S)
Hays Mfg. Co., 801 W. 12th St., Erie, Pa. (C)
Imperial Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill. (C) (S)
Mueller Brass Co., Lapeer Ave., Port Huron, Mich. (C) (S)
Northern Indiana Brass Co., 935 Plum St., Elkhart, Ind. (C) (S)
Parker Appliance Co., The, 17325 Euclid Ave., Cleveland, O. (C) (S)
Phoenix Brass Fittings Corp., Colt St. & Chancellor Ave., Irvington, N. J. (C)
Revere Copper and Brass Incorporated, 230 Park Ave., New York, N. Y. (C) (S)
Streamline Pipe & Fittings Div., Mueller Brass Co., Port Huron, Mich. (C) (S)
Superseal Corp., 300 Fourth Ave., New York, N. Y. (C)
VibraSeal Corp., 2832 E. Grand Blvd., Detroit, Mich. (C)
Walworth Co., 60 E. 42nd St., New York, N. Y. (S) (B)

FITTINGS
Flanged, For CI Pipe

American Cast Iron Pipe Co., 2930 N. 16th St., Birmingham, Ala.
Central Foundry Co., 386 Fourth Ave., New York, N. Y.
Clow & Sons, James B., 201-299 N. Talmon Ave., Chicago, Ill.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Devine Mfg. Co., Inc., J. P., 909 Shawnee Ave., Mt. Vernon, Ill.
Eastern Foundry Co., Spring & Schaefer Sts., Boyertown, Pa.
Frick Co., Waynesboro, Pa.
Grinnell Co., Inc., 260 W. Exchange, Providence, R. I.
Illinois Malleable Iron Co., 1801 Diversey Ave., Chicago, Ill.
Jarecki Mfg. Co., 1345 W. 12th St., Erie, Pa.
Kennedy Valve Mfg. Co., The, Elmira, N. Y.
Kuhns Bros. Co., 1800 McCall St., Dayton, O.
Lumsden & Van Stone Co., 426 First St., South Boston, Mass.
Lynchburg Foundry Co., Peoples Bank Bldg., Lynchburg, Va.
National Machine Wks., 1559 N. Sheffield Ave., Chicago, Ill.
National Valve & Mfg. Co., 3101 Liberty Ave., Pittsburgh, Pa.
Pittsburgh Valve & Fittings Corp., Barberton, O.
Semler Co., Jeanette, Pa.
Stockham Pipe Fittings Co., 4100 Tenth Ave., N., Birmingham, Ala.
Straight Line Foundry & Machine Corp., Direct Separator Div., 218 S. Geddes St., Syracuse, N. Y.
Walworth Co., 60 E. 42nd St., New York, N. Y.
Warren Foundry & Pipe Corp., 11 Broadway, New York, N. Y.

FITTINGS
Pipe, Malleable

Bell & Gossett Co., 3000 Wallace St., Chicago, Ill.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Detroit Brass & Malleable Wks., 100 S. Campbell, Detroit, Mich.
Devlin Mfg. Co., Inc., Thos., Burlington, N. J.
Dresser Mfg. Co., 490 Fisher Ave., Bradford, Pa.
Flagg & Co., Inc., Stanley G., 1421 Chestnut St., Philadelphia, Pa.
General Fittings Co., 123 Georgia Ave., Providence, R. I.
Grabler Mfg. Co., 6565 Broadway, Cleveland, O.
Grinnell Co., Inc., 260 W. Exchange, Providence, R. I.
Illinois Malleable Iron Co., 1801 Diversey Ave., Chicago, Ill.
Jarecki Mfg. Co., 1345 W. 12th St., Erie, Pa.
Jefferson Union Co., Sales Office 601 W. 26th St., New York, N. Y. Factory, Lexington, Mass.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Malleable Iron Fittings Co., Branford, Conn.
Pittsburgh Valve & Fittings Corp., Barberton, O.
Rhode Island Fittings Co., Jefferson St., Hillsgrove, R. I.
Stockham Pipe Fittings Co., 4100 Tenth Ave., N., Birmingham, Ala.
Walworth Co., 60 E. 42 St., New York, N. Y.
Ward Foundries, Inc., J. P., Blossburgh, Pa.

FITTINGS
Refrigeration

Aluminum Co. of America, 801 Gulf Bldg., Pittsburgh, Pa.
American Injector Co., 1481-14th St., Detroit, Mich.
Baker Ice Machine Co., Inc., 1508 Evans St., Omaha, Neb.
Carbondale Div., Worthington Pump & Machinery Corp., Harrison, N. Y.
Chase Brass & Copper Co., 236 Grand St., Waterbury, Conn.
Commonwealth Brass Corp., 5781-5835 Commonwealth Ave., Detroit, Mich.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Frick Co., Waynesboro, Pa.
Henry Valve Co., 1019 N. Spaulding Ave., Chicago, Ill.
Imperial Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.
Kerotest Mfg. Co., 2525 Liberty Ave., Pittsburgh, Pa.
Mueller Brass Co., Lapeer Ave., Port Huron, Mich.
Northern Indiana Brass Co., 935 Plum St., Elkhart, Ind.
Parker Appliance Co., The, 17325 Euclid Ave., Cleveland, O.
Superior Valve and Fittings Co., 1509 W. Liberty Ave., Pittsburgh, Pa.
Triumph Ice Machine Co., 107-109 E. Front St., Cincinnati, O.
Vilter Mfg. Co., 2148 S. First St., Milwaukee, Wis.
Walworth Co., 60 E. 42nd St., New York, N. Y.
Watson-Stillman Co., 140 Aldene Rd., Roselle, N. J.
Weatherhead Co., 300 E. 131st St., Cleveland, O.
Wittenmeier Machinery Co., 850-860 N. Spaulding Ave., Chicago, Ill.
X L Refrigerating Co., Inc., 1834 W. 59th St., Chicago, Ill.
York Ice Machinery Corp., Roosevelt Ave., York, Pa.

FITTINGS
Steel Pipe
Flanged (F), Threaded (T)

Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
Alloy Steel Products Co., 1000 W. Elizabeth Ave., Linden, N. J. (F) (T)
American Rolling Mill Co., The, 703 Curtis St., Middletown, O. (F)
Byers Co., A. M., Clark Bldg., Pittsburgh, Pa.
Central Forging Co., Mill St., Catawissa, Pa. (T)
Crane Co., 836 S. Michigan Ave., Chicago, Ill. (F) (T)
Devlin Mfg. Co., Thos., Burlington, N. J. (T)
Harrisburg Steel Corp., 10th & Herr Sts., Harrisburg, Pa. (T)
Jones & Laughlin Steel Corp., Third & Ross St., Pittsburgh, Pa. (F) (T)
National Valve & Mfg. Co., 3101 Liberty Ave., Pittsburgh, Pa. (F)
Naylor Pipe Co., 1251 E. 92nd St., Chicago, Ill. (F)
Penn Mfg. Corp. of Washington, 380 W. Chestnut St., P. O. Box 484, Washington, Pa. (T)
Reading-Pratt & Cady Div., American Chain & Cable Co., Inc., Tulpehocken St. & L. V. R. R., Reading, Pa. (F) (T)
Semet-Solvay Engrg. Corp., 40 Rector St., New York, N. Y. (F)
Taylor Forge & Pipe Wks., P. O. Box 485, Chicago, Ill. (F)
Walworth Co., 60 E. 42nd St., New York, N. Y. (F) (T)
Watson-Stillman Co., 140 Aldene Rd., Roselle, N. J. (F) (T)

FITTINGS
Welding
Steel (S) and Wrought Iron (W)

American Rolling Mill Co., The, 703 Curtis St., Middletown, O. (S)
Bonney Forge & Tool Wks., Tilghman St. & Meadow St., Allentown, Pa. (S) (W)
Central Forging Co., Mill St., Catawissa, Pa. (S)
Crane Co., 836 S. Michigan Ave., Chicago, Ill. (S)
Edge Moor Iron Wks., 30 Rockefeller Plaza, New York, N. Y. (S)
Fingles Co., The, Reistertown Rd. at Elgin Ave., Baltimore, Md.
Grinnell Co., Inc., 260 W. Exchange, Providence, R. I. (S) (W)
Larkin Packer Co., 6200 Maple Ave., St. Louis, Mo. (S)
Midwest Piping & Supply Co., Inc., Second & Barry St., St. Louis, Mo. (S) (W)
National Valve & Mfg. Co., 3101 Liberty Ave., Pittsburgh, Pa. (S) (W)
Oil Well Supply Co., Oil City, Pa. (S)
Penn Mfg. Corp. of Washington, 380 W. Chestnut St., P. O. Box 484, Washington, Pa. (S) (W)
Reading-Pratt & Cady Div., American Chain & Cable Co., Inc., Tulpehocken St. & L. V. R. R., Reading, Pa. (S)
Roessing Mfg. Co., 1616 Noble St., Sharpsburg Sta., Pittsburgh, Pa.
Semet-Solvay Engineering Corp., 40 Rector St., New York, N. Y. (S)
Shaw-Kendall Engineering Co., The, 120-130 S. Superior St., Toledo, O.
Taylor Forge & Pipe Wks., P. O. Box 485, Chicago, Ill. (S) (W)
Tube-Turns, 224 E. Broadway, Louisville, Ky. (W)
Vogt Machine Co., Henry, 10th & Ormsby Sts., Louisville, Ky. (S)
Walworth Co., 60 E. 42nd St., New York, N. Y. (S) (W)
Watson-Stillman Co., 140 Aldene Rd., Roselle, N. J.
Wedge Protectors, Inc., 9522 Richmond Ave., Cleveland, O. (S)

FLANGED FITTINGS
(See Fittings Flanged for C I Pipe)

FLANGES, PIPE

Aluminum Co. of America, 801 Gulf Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 703 Curtis St., Middletown, O.
Clow & Sons, James B., 201-299 N. Talmon St., Chicago, Ill.
Crane & Co., 836 S. Michigan Ave., Chicago, Ill.
Dart Mfg. Co., E. M., 134 Thurber Ave., Providence, R. I.
Devlin Mfg. Co., Thos., Burlington, N. J.
Flagg & Co., Inc., Stanley G., 1421 Chestnut St., Philadelphia, Pa.
Grabler Mfg. Co., 6565 Broadway, Cleveland, O.
Grinnell Co., Inc., 260 W. Exchange, Providence, R. I.
Harrisburg Steel Corp., 10th & Herr Sts., Harrisburg, Pa.
Henry Valve Co., 1019 N. Spaulding Ave., Chicago, Ill.
Illinois Malleable Iron Co., 1801 Diversey Ave., Chicago, Ill.
Jarecki Mfg. Co., 1345 W. 12th St., Erie, Pa.
Jefferson Union Co., 601 W. 26th St., New York, N. Y.
Jenkins Mfg. Co., 2 W. 45th St., New York, N. Y.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Kuhns Bros. Co., 1800 McCall St., Dayton, O.
Limbert & Co., Geo. B., 570 Fulton St., Chicago, Ill.
Lumsden & Van Stone Co., 426 First St., South Boston, Mass.
Lynchburg Foundry Co., Peoples Bank Bldg., Lynchburg, Va.
Midwest Piping & Supply Co., Inc., Second and Barry St., St. Louis, Mo.
National Valve & Mfg. Co., 3101 Liberty Ave., Pittsburgh, Pa.
Naylor Pipe Co., 1251 E. 92nd St., Chicago, Ill.
Pennsylvania Forge Co., Milnor & Bleigh Sts., Philadelphia, Pa.
Pittsburgh Piping & Equipment Co., 43rd St. & A. V. R. R., Pittsburgh, Pa.
Pittsburgh Valve & Fittings Corp., Barberton, O.
Power Piping Div., Blaw-Knox Co., 829 Beaver Ave., Pittsburgh, Pa.
Ravena Iron Co., Ravena, N. Y.
Rhode Island Fittings Co., Jefferson St., Hillsgrove, R. I.
Roessing Mfg. Co., 1616 Noble St., Sharpsburg Sta., Pittsburgh, Pa.
Semler Co., Jeannette, Pa.
Steel Improvement & Forge Co., 960 Addison Rd., Cleveland, O.
Stokes Rubber Co., Jos., Taylor & Webster, Trenton, N. J. (Hard rubber)
Straight Line Foundry & Machine Corp., Direct Separator Div., 218 S. Geddes St., Syracuse, N. Y.
Taylor Forge & Pipe Wks., P. O. Box 485, Chicago, Ill.
Tube-Turns, 224 E. Broadway, Louisville, Ky.
Vogt Machine Co., Henry, 10th & Ormsby Sts., Louisville, Ky.
Walworth Co., 60 E. 42nd St., New York, N. Y.
Ward Foundries, Inc., J. P., Blossburgh, Pa.
Warren Foundry & Pipe Corp., 11 Broadway, New York, N. Y.
X L Refrigerating Co., Inc., 1834 W. 59th St., Chicago, Ill.

FLOAT VALVES

(See Valves, Steam and Water, Float)

FLOOR PLATES

(See Plates, Floor and Ceiling)

FLUE GAS ANALYZERS

(See Analyzers, CO_2)

FLUE LININGS

Acme Brick Co., 310 N. P. Anderson Bldg., Ft. Worth, Tex.
American Vitrified Products Co., 1500 Union Trust Bldg., Cleveland, O.
Atlas Asbestos Co., Ltd., 110 McGill St., Montreal, Que., Canada.
Bannon Pipe Co., P., 836 S. 13th St., Louisville, Ky.
Blackmer & Post Pipe Co., 2801 Hereford St., St. Louis, Mo.
Cambria Clay Products Co., Blackfork, O.
Dee Material Co., Wm. E., 105 W. Monroe St., Chicago, Ill.
Dennison Sewer Pipe Co., Dennison, O.
Dickey Clay Mfg. Co., W. S., 20 W. 9th St., Kansas City, Mo.
East Ohio Sewer Pipe Co., Irondale, O.
Evans Pipe Co., Newport Rd., Uhrichsville, O.
Evens & Howard Sewer Pipe Co., 5200 Manchester Ave., St. Louis, Mo.
Johns-Manville, 22 E. 40th St., New York, N. Y.
Keasbey & Mattison Co., Butler Ave., Ambler, Pa.
Laclede-Christy Clay Products Co., 411 N. 7th St., St. Louis, Mo.
Patton Clay Mfg. Co., Patton, Pa.
Robinson Clay Product Co., 2nd National Bldg., Akron, O.
Superior Clay Corp., Uhrichsville, O.
Union Clay Mfg. Co., Box 324, Empire, O.
Universal Sewer Pipe Corp., 1500 Union Trust Bldg., Cleveland, O.
Williams-Wallace Co., 160 Hooper St., San Francisco, Cal.

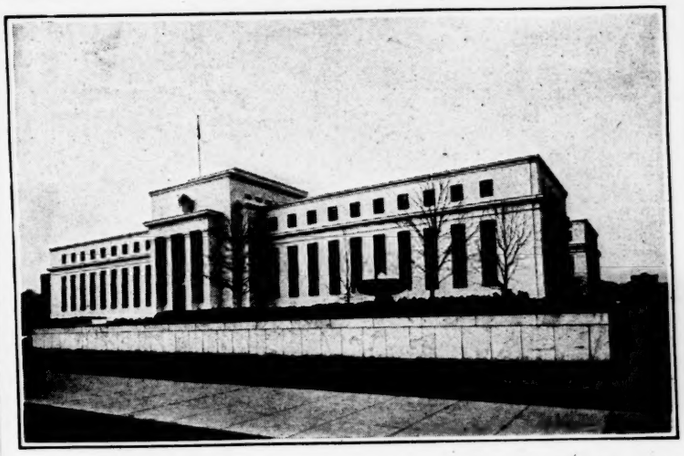
FURNACES

Forced Warm Air

(See also Heaters, Air, Direct-Fired)

For Factories (L), Commercial, Institutional, etc. (I)

Acme Heating & Ventilating Co., Inc., 4224 Lowe Ave., Chicago, Ill. (L)
American Foundry & Furnace Co., 915 E. Washington St., Bloomington, Ill. (L) (I)
American Furnace & Foundry Co., Milan, Mich. (L) (I)
Arcweld Mfg. Co., Inc., 3469 Third Ave., W., Seattle, Wash. (L)
Armstrong Furnace Co., 1649 Olentangy River Rd., Columbus, O. (I)
Atlas Heating & Ventilating Co., Ltd., 557 4th St., San Francisco, Cal. (L) (I)
Auburn Burner Co., Auburn, Ind. (I)
Baker Furnace & Cleaner Mfg. Co., 2505 Albion St., Toledo, O. (I)
Bastian-Morley Co., Inc., 208-308 Truesdell Ave., La Porte, Ind.
Bethlehem Foundry & Machine Co., W. Second St., Bethlehem, Pa.
Bryant Corp., C. L., 4610 St. Clair Ave., Cleveland, O. (I)
Bryant Heater Co., The, 17825 St. Clair Ave., Cleveland, O.
Campbell Heating Co., 31st and Dean, Des Moines, Ia. (L) (I)
Campbell Heating Co., E. K., 2445 Charlotte St., Kansas City, Mo. (L) (I)
Chandler Co., 804 First Ave., N. W., Cedar Rapids, Ia. (I)
Cleveland Steel Products Corp., Toridheet Div., Madison at W. 74th St., Cleveland, O. (I)
Conco Corporation, Mendota, Ill. (L) (I)
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Dail Steel Products Co., 1050 Main St., Lansing, Mich. (L) (I)
Delco Appliance Div. General Motors Sales Corp., Rochester, N. Y.
Dowagiac Steel Furnace Co., Beeson St., Dowagiac, Mich.
Dunham Co., C. A., 450 E. Ohio St., Chicago, Ill. (I)
Easternoil, Inc., 133 Marginal Way, Portland, Me. (I)
Evans Corp., George, 121 37th St., Moline, Ill. (I)
Fitzgibbons Boiler Co., Inc., 101 Park Ave., New York, N. Y. (I)
Forest City Foundries Co., 2500 W. 27th St., Cleveland, O. (L)
Furblo Co., Hermansville, Mich.
Gehri Co., 1117 Tacoma Ave., Tacoma, Wash. (I)
General Electric Co., Air Conditioning & Commercial Ref. Dept., Bloomfield, N. J.
General Oil Burner Corp., 1623 Asquith St., Baltimore, Md.
Gilbert & Barker Mfg. Co., Springfield, Mass.
Green Colonial Furnace Co., 322 S. W. Third St., Des Moines, Ia. (I)
Hall-Neal Furnace Co., 1324 N. Capitol Ave., Indianapolis, Ind. (I)
Hart & Crouse Corp., 301 Turner St., Utica, N. Y.
Henry Furnace & Foundry Co., 3473 E. 49th St., Cleveland, O. (I)
Hess Warming & Ventilating Co., 1221-1227 S. Western Ave., Chicago, Ill. (I)
Home Furnace Co., 6th St. & P. M. R. R., Holland, Mich. (I)
International Heater Co., 101 Park Ave., Utica, N. Y. (I)
Jackson & Church Co., 321 N. Hamilton Ave., Saginaw, Mich. (L) (I)
Johnson Co., S. T., 940 Arlington St., Oakland, Cal.
Kelsey Heating Co., Inc., 277 James St., Syracuse, N. Y. (I)
Kleen-Heat, Inc., 1823 Carroll Ave., Chicago, Ill. (I)
Knowles Air Conditioning, 1324 Marshall St., N. E., Minneapolis, Minn. (I)
Lee Engineering Co., 810 Union National Bank Bldg., Youngstown, O. (L)
Lennox Furnace Co., Inc., Syracuse, N. Y., & Marshalltown, Ia. (L) (I)
Liberty Foundry Co., Sidney & Ohio Ave., St. Louis, Mo. (I)
Magirl Foundry & Furnace Wks., P. H., 401-413 E. Oakland Ave., Bloomington, Ill. (L) (I)
Majestic Co., 733 Erie St., Huntington, Ind. (I) (L)
Marion Furnace Co., 1441 Brooklyn Ave., Detroit, Mich. (I)
May-Fiebeger Co., S. 21st St., Newark, O. (I)
Mayflower Air-Conditioners, Inc., Duluth Ave. & E. Seventh St., St. Paul, Minn. (I)
McCann Furnace Co., 5005 Euclid Ave., Cleveland, O. (L)
McPherson Furnace & Supply Co., 1805 N. E. Second Ave., Portland, Ore. (I)
Meyer Furnace Co., The, 1300 S. Washington St., Peoria, Ill. (I)
Moncrief Furnace Co., P. O. Box 1673, Atlanta, Ga. (L)
Montag Stove & Furnace Wks., 2011 N. Columbia Blvd., Portland, Ore. (L) (I)
Motor Wheel Corp., Duo-Therm Div., 701-735 E. Saginaw St., Lansing, Mich.
Mueller Furnace Co., L. J., 2005 W. Oklahoma Ave., Milwaukee, Wis. (L) (I)
Naylor Corporation, Air Cond. Div., 1230 E. 92nd St., Chicago, Ill. (I)
Nelson Co., 2604 4th Ave., Detroit, Mich. (I)
Nelson Corp., Herman, The, Moline, Ill.
New York Blower Co., 3155 Shields Ave., Chicago, Ill. (L)
Nugent Sons, Inc., Thos., 223 E. 80th St., New York, N. Y.
Olsen Mfg. Co., C. A., Elyria, O. (I)
Palmer Mfg. Corp., Phoenix, Ariz.
Patten Co., J. V., 500 De Kalb Ave., Sycamore, Ill.
Payne Furnace & Supply Co., Inc., 336-338 N. Foothill Rd., Beverly Hills, Cal.
Pennsylvania Furnace & Iron Co., P. O. Box 269, Warren, Pa.



Two Fine New Buildings Equipped with TRADE FRICK MARK Refrigeration

Which provides cold drinking water and "cold" for restaurant service at the Federal Reserve Board Building, in Washington (shown at top), and complete air conditioning for the Federal Land Bank Building in Baltimore (at left). Both installations are credited to the Paul J. Vincent Co., Engineers and Contractors, who are Frick Distributors.

Baltimore's Federal Land Bank Building is Air Conditioned by these No. 3 Frick machines.

You'll find Frick Refrigeration, ice-making and air Conditioning Equipment in thousands of important buildings, from Shanghai to Boston.

Let us quote on the cooling equipment you need: the public appreciates the benefits of modern refrigeration service. Write, wire or 'phone.

WAYNESBORO, PENNA. U.S.A.
FRICK CO.
DEPENDABLE REFRIGERATION SINCE 1882

Premier Furnace Co., Box 150, Dowagiac, Mich. (I)
Ray Oil Burner Co., 401-499 Bernal Ave., San Francisco, Cal.
Reif-Rexoil, Inc., 37 Carroll St., Buffalo, N. Y. (I)
Richmond Radiator Co., Gas Products Div., Uniontown, Pa.
Rosebraugh Co., W. W., 680 S. 17th St., Salem, Ore. (L) (I)
Round Oak Co., Dowagiac, Mich. (I)
Rudy Furnace Co., Lock Box 60, Dowagiac, Mich. (I)
Schwitzer-Cummins Co., 1128 E. 10th St., Indianapolis, Ind. (I)
Sioux City Foundry & Boiler Co., East 8th & Division Sts., Sioux City, Ia. (I)
Stokermatic Co., The, 1415 S. State St., Salt Lake City, Utah.
Timken Silent Automatic Div. Timken-Detroit Axle Co., 100-400 Clark Ave., Detroit, Mich.
United States Radiator Corp., 1056 National Bank Bldg., Detroit, Mich. (I)
Utility Fan Corp., 2528 Santa Fe Ave., Los Angeles, Cal.
Viking Mfg. Co., 12600 Greenfield Rd., Detroit, Mich.
Ward Heater Co., 1800 W. Washington Blvd., Los Angeles, Cal. (I)
Waterman-Waterbury Co., The, 1122 Jackson St., N. E., Minneapolis, Minn. (I)
Western Blower Company, 1800 Airport Way, Seattle, Wash. (I)
Western Furnaces, Inc., 950 Commerce St., Tacoma, Wash. (L)
Williamson Heater Co., 337 W. Fifth St., Cincinnati, O. (I)
Woolery Machine Co., 2919 Como Ave., S. E., Minneapolis, Minn.
XXth Century Heating & Ventilating Co., Ira & Edison Ave., Akron, O. (L)
Zink Co., John, 4401 S. Peoria St., Tulsa, Okla. (L)

FURNACE HUMIDIFIERS

(See Humidifiers, Central Furnace Type)

GAGES

Pressure Indicating

Draft (D). Pressure (P), Vacuum (V)

Ashton Valve Co., 161—1st St., Cambridge, Mass. (P) (V)
Bacharach Industrial Instrument Co., 7000 Bennett St., Pittsburgh, Pa. (D) (P) (V)
Bailey Meter Co., 1050 Ivanhoe Rd., Cleveland, O. (D) (P) (V)
Barnes & Jones, Inc., 128 Brookside Ave., Jamaica Plain, Boston, Mass. (P) (V)
Belfield Co., H., 435 N. Broad St., Philadelphia, Pa. (P) (V)
Bristol Co., Platts Bridge, Waterbury, Conn. (D) (P) (V)
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., 4534 Wayne Ave., Philadelphia, Pa. (D) (P) (V)
Builders Iron Foundry, 9 Codding St., Providence, R. I. (P)
Crew-Equipment Co., Inc., 101 Park Ave., New York, N. Y. (D)
Defender Automatic Regulator Co., 308 S. 8th St., St. Louis, Mo. (D) (P) (V)
Detroit Air Meter Co., Box 1473, Detroit, Mich. (D)
Detroit Brass & Malleable Wks., 100 S. Campbell, Detroit, Mich. (P)
Dunham Co., C. A., 450 E. Ohio St., Chicago, Ill. (P)
Dwyer Mfg. Co., F. W., 565 W. Washington Blvd., Chicago, Ill. (D)
Electric Auto-Lite Co., Moto Meter Gauge & Equipment Div., Caledonia & Gillette Sts., La Crosse, Wis. (P) (V)
Ellison Draft Gage Co., 214 W. Kinzie St., Chicago, Ill. (D)
Foxboro Co., 106 Neponset Ave., Foxboro, Mass. (P)
Friez & Sons, Julien P., 4 N. Central Ave., Baltimore, Md. (D) (P) (V)
Hays Corp., E. 8th St., Michigan City, Ind. (D) (P)
Hill, E. Vernon, 6826 W. Highland Ave., Chicago, Ill. (D) (P)
Hoffman Specialty Co., Inc., Waterbury National Bank Bldg., Waterbury, Conn. (V)
Huyette Co., Inc., Paul B., 401 N. Broad St., Philadelphia, Pa. (D) (P) (V)
Leeds & Northrup Co., 4970 Stenton Ave., Philadelphia, Pa. (D)
Lonergan Co., J. E., 211 Race St., Philadelphia, Pa. (P) (V)
Lunkenheimer Co., Waverly & Beekman Sts., Cincinnati, O.
Manning, Maxwell & Moore, Inc., Ashcroft American Gauge Div., 11 Elias St., Bridgeport, Conn. (D)
Marsh Corp., Jas. P., 2073 Southport Ave., Chicago, Ill.
Mercoid Corp., 4201 Belmont Ave., Chicago, Ill. (P) (V)
Meriam Co., The, 1955 W. 112th St., Cleveland, O. (D) (P) (V)
Moeller Instrument Co., 132nd St., & 89th Ave., Richmond Hill, N. Y. (D) (P) (V)
Mouat Vapor Heating Co., The, 1246-1254 W. 4th St., Cleveland, O. (P) (V)
Pierce, Butler Radiator Corp., 701 Nichols Ave., Syracuse, N. Y. (P)
Precision Thermometer & Instrument Co., 1434 Brandywine St., Philadelphia, Pa. (D) (P) (V)
Preferred Utilities Mfg. Co., 33 W. 60th St., New York, N. Y. (D)
Republic Flow Meters Co., 2240 Diversey Pkwy., Chicago, Ill. (D) (P) (V)
Rochester Mfg. Co., Inc., Rochester, N. Y. (P) (V)
Scientific Instrument Co., 531-35 W. Larned, Detroit, Mich. (D) (P) (V)
Star Brass Mfg. Co., 108 E. Dedham St., Boston, Mass. (P) (V)
Spence Engrg. Co., Inc., 28 Grant St., Walden, N. Y. (D)
Sterling, Inc., 3738 N. Holton St., Milwaukee, Wis. (P) (V)
Taylor Instrument Companies, 95 Ames St., Rochester, N. Y. (D) (P) (V)
Trerice Co., H. O., 1420 W. Lafayette Blvd., Detroit, Mich. (D)
Uehling Instrument Co., 473 Getty Ave., Paterson, N. J. (D) (P) (V)
United States Gauge Co., 44 Beaver St., New York, N. Y. (P) (V)
Weaver Mfg. Co., Springfield, Ill.
Wheelco Instruments Co., 1933 S. Halsted St., Chicago, Ill. (D)

GAGES

Liquid Level

American Injector Co., 1481—14th St., Detroit, Mich.
Bacharach Industrial Instrument Co., 7000 Bennett St., Pittsburgh, Pa.
Bell & Gossett Co., 3000 Wallace St., Chicago, Ill.
Bordo Co., Inc., L. J., 115 New St., Glenside, Pa.
Boston Auto Gage Co., 70 West St., Pittsfield, Mass.
Bristol Co., Platts Bridge, Waterbury, Conn.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., 4534 Wayne Ave., Philadelphia, Pa.
Caldwell Co., W. E., 2120 Brook St., Louisville, Ky.
Defender Automatic Regulator Co., 308 S. 8th St., St. Louis, Mo.
Detroit Lubricator Co., 5900 Trumbull Ave., Detroit, Mich.
Diamond Power Specialty Corp., 10340 Oakland, Detroit, Mich.
Electric Auto-Lite Co., Moto Meter Gauge & Equipment Div., Caledonia & Gillette Sts., La Crosse, Wis.
Foxboro Co., 106 Neponset Ave., Foxboro, Mass.
Hays Corp., E. 8th St., Michigan City, Ind.
Henry Valve Co., 1019 N. Spaulding Ave., Chicago, Ill.
Huyette Co., Inc., Paul B., 401 N. Broad St., Philadelphia, Pa.
Keckley Co., O. C., 400 W. Madison St., Chicago, Ill.
Kieley & Mueller, Inc., 40 W. 13th St., New York, N. Y.
King Engineering Corp., 1940 Willard Ave., Ann Arbor, Mich.
Klingerit, Inc., 16-22 Hudson St., New York, N. Y.
Liquidometer Corp., 37-15 Skillman Ave., Long Island City, N. Y.
Lonergan Co., J. E., 211 Race St., Philadelphia, Pa.
Mason-Neilan Regulator Co., 1190 Adams St., Boston, Mass.
Meriam Co., The, 1955 W. 112th St., Cleveland, O.
Minneapolis-Honeywell Regulator Co., 2701 Fourth Ave., South, Minneapolis, Minn.
Nason Co., 1050 Mt. Elliott Ave., Detroit, Mich.
Petrometer Corp., 1 Star Sq., Long Island City, N. Y.
Powell Co., Wm., 2525 Spring Grove Ave., Cincinnati, O.
Reliance Gauge Column Co., 5902 Carnegie Ave., Cleveland, O.
Republic Flow Meters Co., 2240 Diversey Pkwy., Chicago, Ill.
Rochester Mfg. Co., Inc., Rochester, N. Y.
Schutte & Koerting Co., 12th and Thompson Sts., Philadelphia, Pa.
Scientific Instrument Co., 531-35 W. Larned, Detroit, Mich.
Taylor Instrument Companies, 95 Ames St., Rochester, N. Y.
Uehling Instrument Co., 473 Getty Ave., Paterson, N. J.
United States Gauge Co., 44 Beaver St., New York, N. Y.
Viking Pump Co., Fourth and State Sts., Cedar Falls, Ia.
Wheelco Instruments Co., 1933 S. Halsted St., Chicago, Ill.
Wright-Austin Co., 315 W. Woodbridge St., Detroit, Mich.
Yarnall-Waring Co., Chestnut Hill, Philadelphia, Pa.

GAGES

Temperature

Belfield Co., H., 435 N. Broad St., Philadelphia, Pa.
Caldwell Co., W. E., 2120 Brook St., Louisville, Ky.
Connelly Iron Sponge & Governor Co., 200 S. 2nd St., Elizabeth, N. J.
Electric Auto-Lite Co., Moto Meter Gauge & Equipment Div., Caledonia & Gillette Sts., La Crosse, Wis.
Foxboro Co., 106 Neponset Ave., Foxboro, Mass.
Friez & Sons, Inc., Julien P., 4 N. Central Ave., Baltimore, Md.
General Scientific Equipment Co., 2735 N. Broad St., Philadelphia, Pa.
Jones-Motrola Sales Co., 432 Fairfield Ave., Stamford, Conn.
Lonergan Co., J. E., 211 Race St., Philadelphia, Pa.
Manning, Maxwell & Moore, Inc., 11 Elias St., Bridgeport, Conn.
Marsh, Corp., Jas. P., 2089 Southport Ave., Chicago, Ill.
Marshalltown Mfg. Co., 901 E. Nevada, Marshalltown, Ia.
Mason-Neilan Regulator Co., 1190 Adams St., Boston, Mass.
Mercoid Corp., The, 4201 Belmont Ave., Chicago, Ill.
National Gauge Corp., 300 Pacific St., Brooklyn, N. Y.
Precision Thermometer & Instrument Co., 1434 Brandywine St., Philadelphia, Pa.
Rochester Mfg. Co., Inc., Rochester, N. Y.
Scientific Instrument Co., 531-35 W. Larned, Detroit, Mich.
Taylor Instrument Companies, 95 Ames St., Rochester, N. Y.
Thrush & Co., H. A., 21 E. Riverside Drive, Peru, Ind.
Trerice Co., H. O., 1420 W. Lafayette Blvd., Detroit, Mich.
United States Gauge Co., 44 Beaver St., New York, N. Y.
Weaver Mfg. Co., Springfield, Ill.
Weston Electrical Instrument Corp., 619 Frelinghuysen Ave., Newark, N. J.
Wheelco Instruments Co., 1933 S. Halsted St., Chicago, Ill.

GAS BOILERS

(See Boiler-Burner Units, Gas-Fired)

GAS BURNERS

(See Burners, Gas)

GAS RADIATORS

(See Radiators, Gas-Steam)

GAS UNIT HEATERS

(See Unit Heaters, Gas-Fired)

GATES, BLAST

American Blower Corp., 6000 Russell St., Detroit, Mich.
Bayley Blower Co., 1817 S. 66th St., Milwaukee, Wis.
Berger Bros., 229-237 Arch St., Philadelphia, Pa.
Chicago Metal Mfg. Co., 3724 S. Rockwell St., Chicago, Ill.
Clarage Fan Co., Porter St., Kalamazoo, Mich.
Garden City Fan Co., 332 S. Michigan Ave., Chicago, Ill.
Goethel Co., Alfred Co., 2337 N. 31st St., Milwaukee, Wis.
Goethel Sheet Metal Works, Alfred, 1910 N. Killian Pl., Milwaukee, Wis.
Grand Rapids Blow Pipe and Dust Arrester Co., 525-28 Monroe Ave., Grand Rapids, Mich.
Industrial Sheet Metal Works, Inc., 628 E. Forest Ave., Detroit, Mich.
Kirk & Blum Mfg. Co., 2838-52 Spring Grove Ave., Cincinnati, O.
Puhl & Hepper Mfg. Co., Inc., 6400 W. Florissant Ave., St. Louis, Mo.
Sturtevant Co., B. F., Damon St., Hyde Park, Boston, Mass.
Western Blower Co., 1800 Airport Way, Seattle, Wash.

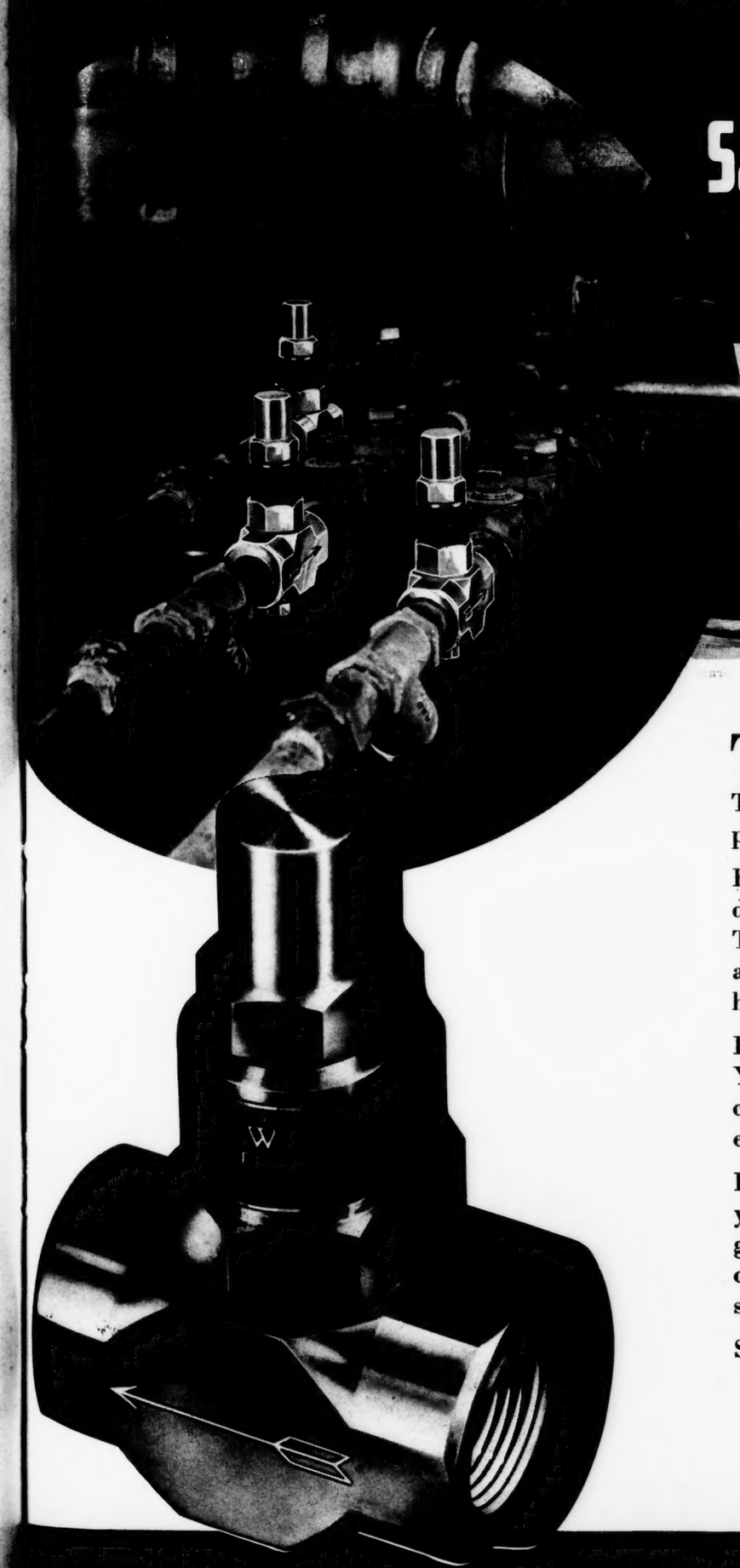
GASKETS

Akron Metallic Gasket Co., 155 N. Union, Akron, O.
Alpha Metal & Rolling Mills, Inc., 363 Hudson Ave., Brooklyn, N. Y.
Anchor Packing Co., 401 N. Broad St., Philadelphia, Pa.
Armstrong Cork Co., 994 Concord St., Lancaster, Pa.
Atlas Asbestos Co., Ltd., 110 McGill St., Montreal, Que, Canada.
Azor Corp., Newark, N. J.
Butterworth, Jr., B. T., Oak St., New Canaan, Conn.
Chicago-Wilcox Mfg. Co., E. 77th St., and Anthony Ave., Chicago, Ill.
Clow & Sons, James B., 201-299 N. Talmon Ave., Chicago, Ill.
Continental Diamond Fibre Co., Newark, Del.
Continental Rubber Wks., 1905 Liberty Blvd., Erie, Pa.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Crane Packing Co., 1801 Belle Plaine Ave., Chicago, Ill.
Darcoid Co., Inc., 145—6th Ave., New York, N. Y.
Durabla Mfg. Co., 114 Liberty St., New York, N. Y.
Ehret Magnesia Mfg. Co., Valley Forge, Pa.
Endura Mfg. Corp., 45 N. 4th St., Quakertown, Pa.
Excelsior Leather Washer Co., 720-730 Chestnut St., Rockford, Ill.
Felt Products Mfg. Co., 1514 Carroll Ave., Chicago, Ill.
Flexitalic Gasket Co., 8th & Bailey Sts., Camden, N. J.
Garlock Packing Co., 50 Main St., Palmyra, N. Y.
Gatke Corp., 228 N. La Salle St., Chicago, Ill.
Goetze Gasket & Packing Co., Inc., 60 Allen Ave., New Brunswick, N. J.
Graton & Knight Co., 356 Franklin St., Worcester, Mass.
Houghton & Co., E. F., 240 W. Somerset St., Philadelphia, Pa.
Jenkins Bros., 80 White St., New York, N. Y.
Johns-Manville, 22 E. 40th St., New York, N. Y.
Keasbey & Mattison Co., Butler Ave., Ambler, Pa.
Klingerit, Inc., 16-22 Hudson St., New York, N. Y.
Manhattan Rubber Mfg. Div., of Raybestos-Manhattan, Inc., 61 Willett St., Passaic, N. J.
McCord Radiator & Mfg. Co., 2587 E. Grand Blvd., Detroit, Mich.
Metallo Gasket Co., 16 Bethany St., New Brunswick, N. J.

Individual Trapping with YARWAYS

Speeds Heating-up
Saves Shut-Down Time

for Eagle Dye Works, Hartford, Conn.



TWO YEARS AGO, the Eagle Dye Works of Hartford, Conn., installed several Yarway Impulse Traps . . . liked them so well they trapped all their presses with Yarways.

Formerly they had used one large trap of another design to drain each group of from four to six presses. This resulted in sluggish heating-up and whenever anything happened to one trap, a battery of machines had to be shut down until the trap could be repaired.

Individual trapping of all twenty-four presses with Yarway Impulse Traps has increased heating efficiency, reduced down-time of presses, practically eliminated trap maintenance trouble and expense.

Let the Yarway Trap show you what it can do to end your trap troubles, give you quicker heating and greater sustained heating efficiency, save you money on installation, maintenance, fuel—and you, too, will standardize on the Yarway.

See your Mill Supply dealer or write for Catalog T-1735.

YARNALL-WARING COMPANY
104 Mermaid Avenue Philadelphia

Miller Rubber Co., Inc., 1247 S. High St., Akron, O.
Mitchell & Smith, Inc., 9469 Copeland Ave., Detroit, Mich.
Pacific States Felt & Mfg. Co., Inc., 845 Howard St., San Francisco, Cal.
Resistoflex Corp., Belleville, N. J.
Smooth-On Mfg. Co., 568-574 Communipaw Ave., Jersey City, N. J.
Steel Improvement & Forge Co., 960 Addison Rd., Cleveland, O.
Stokes Rubber Co., Jos., Taylor & Webster, Trenton, N. J.
Thermoid Rubber Co., Whitehead Rd., Trenton, N. J.
Union Asbestos & Rubber Co., 54th Ave., and 18th St., Cicero, Ill.
United States Rubber Co., 1790 Broadway, New York, N. Y.
Western Felt Wks., 4029-4117 Ogden Ave., Chicago, Ill.
Wills Gasket, Ltd., New Bedford, Mass.
Wilson, Inc., Grant, 4115 W. Taylor St., Chicago, Ill.

GOVERNORS, PUMP

Atlas Valve Co., Inc., 282 South St., Newark, N. J.
Bailey Meter Co., 1050 Ivanhoe Rd., Cleveland, O.
Boylston Steam Specialty Co., 116-122 W. Illinois St., Chicago, Ill.
Burrows Mfg. Co., F. A., 1638 E. Market St., York, Pa.
Cash Co., A. W., P. O. Box 135, Decatur, Ill.
Davis Regulator Co., 2546 S. Washtenaw Ave., Chicago, Ill.
Defender Automatic Regulator Co., 308 S. 8th St., St. Louis, Mo.
Fisher Governor Co., 201 S. First Ave., Marshalltown, Ia.
Foster Engineering Co., 109 Monroe St., Newark, N. J.
Gardner-Denver Co., Gardner and First Aves., Quincy, Ill.
Illinois Engineering Co., 2035 S. Racine Ave., Chicago, Ill.
Jarecki Mfg. Co., 1345 W. 12th St., Erie, Pa.
Keckley Co., O. C., 400 W. Madison St., Chicago, Ill.
Kieley & Mueller, Inc., 34 W. 13th St., New York, N. Y.
Klipfel Mfg. Co., 2651 W. Harrison St., Chicago, Ill.
Leslie Co., Valley Brook & Grant Aves., Lyndhurst, N. J.
Locke Regulator Co., 76 North St., Salem, Mass.
Mason-Neilan Regulator Co., 1190 Adams St., Boston, Mass.
McAlear Mfg. Co., 1901-1909 S. Western Ave., Chicago, Ill.
Mueller Co., Decatur, Ill.
Mueller Steam Specialty Co., Inc., 351 W. 26th St., New York, N. Y.
Northern Equipment Co., 1945 Grove Drive, Erie, Pa.
Reading-Pratt & Cady Div., American Chain & Cable Co., Inc., Reading, Pa.
Ruggles-Klingemann Mfg. Co., 4 Foster Ct., Salem, Mass.
Schade Valve Mfg. Co., 2527 N. Bodine St., Philadelphia, Pa.
Spence Engineering Co., Inc., 28 Grant St., Walden, N. Y.
Squires Co., C. E., E. 40th St., & Kelley Ave., Cleveland, O.
Staples & Pfeiffer, Ltd., 528 Bryant St., San Francisco, Cal.
Strong, Carlisle & Hammond Co., The, 1392 W. Third St., Cleveland, O.
Swartwout Co., 18511 Euclid Ave., Cleveland, O.
Watson & McDaniel Co., 440 N. Marshall, Philadelphia, Pa.
Watts Regulator Co., 10 Embankment St., Lawrence, Mass.
Webster & Co., Warren, 17th & Federal Sts., Camden, N. J.
Williams Gauge Co., 1620 Pennsylvania Ave., N. S., Pittsburgh, Pa.
Wright-Austin Co., 315 W. Woodbridge St., Detroit, Mich.

GRILLES

(See Also Registers and Diffusers, Air)

Acme Tin Plate & Roofing Supply Co., 3rd & Westmoreland Sts., Philadelphia, Pa.
Air Control Products, Inc., Glades St. and Larch, Muskegon, Mich.
Aircraft Mfg. Co., 418 E. First St., Dayton, O.
Air Devices, Inc., 17 E. 42nd St., New York, N. Y.
American Foundry & Furnace Co., Washington at McClun, Bloomington, Ill.
American Warming & Ventilating Co., 1017-1021 Summit St., Toledo, O.
Anemostat Corp. of America, 10 E. 39th St., New York, N. Y.
Auer Register Co., 3608 Payne Ave., Cleveland, O.
Barber-Colman Co., 225 Loomis St., Rockford, Ill.
Beckley Perforating Co., 315 North Ave., Garwood, N. J.
Best Register Co., 2005 W. Oklahoma Ave., Milwaukee, Wis.
Campbell Heating Co., E. K., 2445 Charlotte St., Kansas City, Mo.
Central Wire & Iron Wks., 621 E. Locust St., Des Moines, Ia.
Char-Gale Mfg. Co., 3127 Hiawatha Ave., Minneapolis, Minn.
Chicago Perforating Co., 2445 W. 24th Pl., Chicago, Ill.
Cross Engineering Co., 160-178 Dundaff St., Carbondale, Pa.
Crown Iron & Steel Works, 1229 N. E. Tyler, Minneapolis, Minn.
Decatur Iron & Steel Co., Decatur, Ala.
Diamond Mfg. Co., 253 W. Eighth St., Wyoming, Pa.
Erdle Perforating Co., 171 York St., Rochester, N. Y.
Falstrom Co., Main Ave. & D. L. & W. R. R., Passaic, N. J.
Gillian Mfg. Co., 7752 Dubois St., Detroit, Mich.
Globe Machine & Stamping Co., 1250 W. 76th St., Cleveland, O.
Harrington & King Perforating Co., 5655 Fillmore St., Chicago, Ill.
Hart & Cooley Mfg. Co., Holland, Mich.
Hendrick Mfg. Co., 37 Dundaff St., Carbondale, Pa.
Independent Register Co., 3747 E. 93rd St., Cleveland, O.
Lamneck Products, Inc., 416-36 Dublin Ave., Columbus, O.
Majestic Co., 733 Erie St., Huntington, Ind.
Manhattan Perforated Metal Co., Inc., 43-17 37th St., Long Island City, N. Y.
Metalace Corp., 60 K St., So. Boston, Mass.
Milcor Steel Co., S. 41st & Burnham Sts., Milwaukee, Wis.
Mueller Furnace Co., L. J., 2005 W. Oklahoma Ave., Milwaukee, Wis.
Mundt & Sons, Charles, 53 Fairmount Ave., Jersey City, N. J.
Newman Brothers, Inc., 662-670 W. 4th St., Cincinnati, O.
Register & Grille Mfg. Co., 70 Berry St., Brooklyn, N. Y.
Reliable Perforating Co., 2047 N. Wood St., Chicago, Ill.
Roberts-Hamilton Co., 707-715 S. Third St., Minneapolis, Minn.
Rock Island Register Co., 2425 Fifth Ave., Rock Island, Ill.
Standard Stamping & Perforating Co., 3131 W. 49th Pl., Chicago, Ill.
Trane Co., The, La Crosse, Wis.
Tuttle & Bailey, Inc., Corbin Ave., New Britain, Conn.
U. S. Air Conditioning Corp., 2101 Kennedy St., N. E., Minneapolis, Minn.
United States Register Co., Burnham St., Battle Creek, Mich.
Waterloo Register Co., 600 Anita St., Waterloo, Ia.
Western Wire & Iron Works, Inc., 945 W. 18th Pl., Chicago, Ill.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York, N. Y.

HANGERS, RADIATOR

American Foundry & Furnace Co., Washington St. at McClun, Bloomington, Ill.
American Radiator & Standard Sanitary Corp., Bessemer Bldg., Pittsburgh, Pa.
Burnham Boiler Corp., Main St., Irvington, N. Y.
Carpenter & Paterson, Inc., 1190 Bennington St., East Boston, Mass.
Carty & Moore Engineering Co., 511 W. Larned St., Detroit, Mich.
Chicago Nipple Mfg. Co., 1966 Southport Ave., Chicago, Ill.
Crawford Co., 3220 W. 31st St., Chicago, Ill.
Fee & Mason Mfg. Co., Inc., 81 Beekman St., New York, N. Y.
Fluid Heat Division, Anchor Post Fence Co., Eastern Ave. & Kane St., Baltimore, Md.
Grabler Mfg. Co., 6565 Broadway, Cleveland, O.
Grinnell Co., Inc., 260 W. Exchange, Providence, R. I.
Hartmann Co., Chas., 985 Dean St., Brooklyn, N. Y.
Healy Ruff Co., 765 Hampden Ave., St. Paul, Minn.
Inland Mfg. Co., 1120 N. Cicero Ave., Chicago, Ill. (Unit heater hangers)
Jennison Co., 17 Putnam St., Fitchburg, Mass. (Adjustable radiator foot rest)
Logansport Radiator Equipment Co., 21st and Erie Ave., Logansport, Ind.
McAlear Mfg. Co., 1901-1909 S. Western Ave., Chicago, Ill.
National Radiator Co., 221 Central Ave., Johnstown, Pa.
Paine Co., 2951 W. Carroll Ave., Chicago, Ill.
Pierce, Butler Radiator Corp., 701 Nichols Ave., Syracuse, N. Y.
Richmond Radiator Co., Gas Products Div., Uniontown, Pa.
Sterling, Inc., 3738 N. Holton St., Milwaukee, Wis.
United States Radiator Corp., 1056 National Bank Bldg., Detroit, Mich.
Western Hanger Co., 55 New Montgomery St., San Francisco, Cal.

HANGERS, PIPE

American District Steam Co., Bryant St., North Tonawanda, N. Y.
Baker Ice Machine Co., Inc., 1508 Evans St., Omaha, Neb.
Beaton & Cadwell Mfg. Co., 185 Main St., New Britain, Conn.
Carpenter & Paterson, Inc., 1190 Bennington St., East Boston, Mass.
Carty & Moore Engineering Co., 511 W. Larned St., Detroit, Mich.
Chicago Nipple Mfg. Co., 1966 Southport Ave., Chicago, Ill.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Crawford Co., 3220 W. 31st St., Chicago, Ill.
Devlin Mfg. Co., Inc., Thos., Burlington, N. J.
Farley Sleeve & Hanger Co., 3748 E. 71st St., Cleveland, O.
Fee & Mason Mfg. Co., Inc., 81 Beekman St., New York, N. Y.
Globe Machine & Stamping Co., 1250 W. 76th St., Cleveland, O.
Grabler Mfg. Co., 6565 Broadway, Cleveland, O.
Grinnell Co., Inc., 260 W. Exchange, Providence, R. I.
Illinois Malleable Iron Co., 1801 Diversey Ave., Chicago, Ill.
Jarecki Mfg. Co., 1345 W. 12th St., Erie, Pa.
Lumsden & Van Stone Co., 426 First St., South Boston, Mass.
Midwest Piping & Supply Co., Inc., Second and Barry St., St. Louis, Mo.
National Valve & Mfg. Co., 3101 Liberty Ave., Pittsburgh, Pa.
Paine Co., 2951 W. Carroll Ave., Chicago, Ill.
Pittsburgh Valve & Fittings Corp., Barberton, O.
Ravena Iron Co., Ravena, N. Y.
Reznor Mfg. Co., Mercer, Pa.
Ric-wil Co., 1563 Union Commerce Bldg., Cleveland, O.
Rockwood Sprinkler Co., 38 Harlow St., Worcester, Mass.
Roessing Mfg. Co., 1616 Noble St., Sharpsburg Sta., Pittsburgh, Pa.
Semler Co., Jeannette, Pa.
Sioux City Foundry & Boiler Co., E. 8th & Division Sts., Sioux City, Ia.
Walworth Co., 60 E. 42nd St., New York, N. Y.
Ward Foundries, Inc., J. P., Blossburg, Pa.
Western Wire Products Co., 1415-35 S. 18th St., St. Louis, Mo.

HEADERS, WELDED

Acme Industries, Inc., Cor. Mechanic and Ganson Sts., Jackson, Mich.
Baker Ice Machine Co., Inc., 1508 Evans St., Omaha, Nebr.
Chicago Nipple Mfg. Co., 1966 Southport Ave., Chicago, Ill.
Columbian Steel Tank Co., 1509 W. 12th St., Kansas City, Mo.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Grinnell Co., Inc., 260 W. Exchange, Providence, R. I.
International Engineering Wks., Inc., Box 71, Framingham, Mass.
Kellogg Co., M. W., The, 225 Broadway, New York, N. Y.
Limbert & Co., Geo. B., 570 Fulton St., Chicago, Ill.
Lumsden & Van Stone Co., 426 First St., South Boston, Mass.
Midwest Piping & Supply Co., Inc., Second and Barry St., St. Louis, Mo.
National Pipe Bending Co., 122 River St., New Haven, Conn.
National Valve & Mfg. Co., 3101 Liberty St., Pittsburgh, Pa.
Ohio Pipe Bending & Mach. Co., 3900-3910 Trent Ave., Cleveland,
Philadelphia Pipe Bending Co., 4135-65 N. Fifth St., Philadelphia, Pa.
Pittsburgh Pipe Coil & Bending Co., 61 Bridge St., Etna, Pa.
Pittsburgh Piping & Equipment Co., 43rd St. & A. V. R. R., Pittsburgh, Pa.
Power Piping Div., Blaw-Knox Co., 829 Beaver Ave., Pittsburgh, Pa.
Rempe Co., 340 N. Sacramento Blvd., Chicago, Ill.
Roessing Mfg. Co., 1616 Noble St., Sharpsburg Sta., Pittsburgh, Pa.
Sales & Co., Murray W., 801 W. Baltimore Ave., Detroit, Mich.
Semet-Solvay Engineering Corp., 40 Rector St., New York, N. Y.
Shaw Co., Benjamin F., Second & Lombard Sts., Wilmington, Del.
Shaw-Kendall Engineering Co., The, 120-130 S. Superior St., Toledo, O.
X L Refrigerating Co., 1834 W. 59th St., Chicago, Ill.

HEAT INSULATING GLASS

(See Windows, Heat Insulating Glass)

HEATING SURFACE

(See Surface, Heating Indirect)

HEATERS, AIR

Direct Fired

Air Devices, Inc., 17 E. 42nd St., New York, N. Y.
Airtemp, Div. of Chrysler Corp., Dayton, O.
Airtherm Mfg. Co., 700 S. Spring Ave., St. Louis, Mo.
American Furnace & Foundry Co., Milan, Mich.
Bryant Corp., C. L., 4610 St. Clair Ave., Cleveland, O.
Bryant Heater Co., The, 17825 St. Clair Ave., Cleveland, O.
Campbell Heating Co., E. K., 2445 Charlotte St., Kansas City, Mo.
Chandler Co., 804 First Ave., N.W., Cedar Rapids, Ia.
Despatch Oven Co., 600 Ninth St., S. E., Minneapolis, Minn.
Dravo Corp., Dravo Bldg., Pittsburgh, Pa.
Fitzgibbons Boiler Co., Inc., 101 Park Ave., New York, N. Y.
Fluid Heat Division, Anchor Post Fence Co., Eastern Ave. & Kane St., Baltimore, Md.
Furblo Co., Hermansville, Mich.
Gilbert & Barker Mfg. Co., Springfield, Mass.
Grand Rapids Blow Pipe & Dust Arrester Co., 525-28 Monroe Ave., Grand Rapids, Mich.
Jackson & Church Co., 321 N. Hamilton Ave., Saginaw, Mich.
Johnson Co., S. T., 940 Arlington St., Oakland, Cal.
Lee Engineering Co., 810 Union National Bank Bldg., Youngstown, O.
Little Burner Co., H. C., 2nd & Lincoln Ave., San Rafael, Cal.
Magirl Foundry & Furnace Wks., P. H., 401-413 E. Oakland Ave., Bloomington, Ill.

McCann Furnace Co., 5005 Euclid Ave., Cleveland, O.
Meyer Furnace Co., The, 1300 S. Washington St., Peoria, Ill.
National Machine Wks., 1559 N. Sheffield Ave., Chicago, Ill.
Natural Gas Equipment Incorporated, 539 Petroleum Bldg., Los Angeles, Cal.
Nelson Co., 2604 Fourth Ave., Detroit, Mich.
New York Blower Co., 3155 Shields Ave., Chicago, Ill.
Nugent Sons, Inc., Thos., 223 E. 80th St., New York, N. Y.
Olsen Mfg. Co., C. A., The, Elyria, O.
Palmer Mfg. Corp., Phoenix, Ariz.
Patten Co., J. V., 500 De Kalb Ave., Sycamore, Ill.
Payne Furnace & Supply Co., Inc., 336-338 N. Foothill Rd., Beverly Hills, Cal.
Pennsylvania Furnace & Iron Co., P.O. Box 269, Warren, Pa.
Prat-Daniel Corp., Port Chester, N. Y.
Reznor Mfg. Co., Mercer, Pa.
Ross Engineering Corp., J. O., 350 Madison Ave., New York, N. Y.
Smith, Inc., James Campbell, 1679 Collamer Rd., Cleveland, O.
Stokermatic Co., The, 1415 S. State St., Salt Lake City, Utah.
Supreme Heater & Ventilating Corp., 1911 N. Market St., St. Louis, Mo.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.
Timken Silent Automatic Div. Timken-Detroit Axle Co., 100-400 Clark Ave., Detroit, Mich.
Trane Co., The, La Crosse, Wis.
Utility Fan Corp., 2528 Santa Fe Ave., Los Angeles, Cal.
Waterman - Waterbury Co., The, 1122 Jackson St., N. E., Minneapolis, Minn.
Williams, Inc., F. C., 22667 Michigan Ave., Dearborn, Mich.

HEATERS, DUCT

Electric (E) and Gas (G)

Bryant Heater Co., The, 17825 St. Clair Ave., Cleveland, O. (G)
Campbell Heating Co., E. K., 2445 Charlotte St., Kansas City, Mo. (G)
Despatch Oven Co., 600 Ninth St., S. E., Minneapolis, Minn.
Dravo Corp., Dravo Bldg., Pittsburgh, Pa. (G)
General Electric Co., 1 River Rd., Schenectady, N. Y. (E)
General Heater Co., 7 N. Cypress St., Burbank, Cal. (E)
Heating Equipment Co., 1123 Harrison St., San Francisco, Calif.
Hynes Electric Heating Co., 240 Cherry St., Philadelphia, Pa. (E)
Natural Gas Equipment Incorporated, 539 Petroleum Bldg., Los Angeles, Cal. (G)
Nugent Sons, Inc., Thos., 223 E. 80th St., New York, N. Y.
Pacific Gas Radiator Co., Roseberry and Walter Sts., Huntington Park, Cal. (G)
Palmer Mfg. Co., Phoenix, Ariz. (G)
Pennsylvania Furnace & Iron Co., P.O. Box 269, Warren, Pa.
Reznor Mfg. Co., Mercer Pa. (G)
Richmond Radiator Co., Gas Products Div., Uniontown, Pa. (G)
Thermador Elec. Mfg. Co., 2821 E. Pico Blvd., Los Angeles, Cal.
Trent Co., Harold E., 55th St. & Wyalusing Ave., Philadelphia, Pa. (E)
Utility Fan Corp., 2528 Santa Fe Ave., Los Angeles, Cal. (G)
Ward Heater Co., 1800 W. Washington Blvd., Los Angeles, Cal. (G)
Wesix Elec. Heater Co., 390 1st St., San Francisco, Cal. (E)
Wiegand Co., Edwin L., 7500 Thomas Blvd., Pittsburgh, Pa. (E)

HEATERS, ELECTRIC
Strip and Immersion

Acme Electric Heating Co., Inc., 1217 Washington St., Boston, Mass.
American Instrument Co., Silver Spring, Md.
Cutler-Hammer, Inc., N. 12th St. and W. St. Paul Ave., Milwaukee, Wis.
General Electric Co., 1 River Rd., Schenectady, N. Y.
General Heater Co., 7 N. Cypress St., Burbank, Cal.
Hynes Electric Heating Co., 240 Cherry St., Philadelphia, Pa.
Red Spot Electric Co., 4302 S. Tacoma Way, Tacoma, Wash.
Russell Electric Co., 348 W. Huron St., Chicago, Ill.
Trent Co., Harold E., 55th St. & Wyalusing Ave., Philadelphia, Pa.
Vulcan Electric Co., Lynn, Mass.
Warren Electric Appliance Co., Warren Bank & Trust Co. Bldg., Warren, Pa.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
Wiegand Co., Edwin L., 7500 Thomas Blvd., Pittsburgh, Pa.

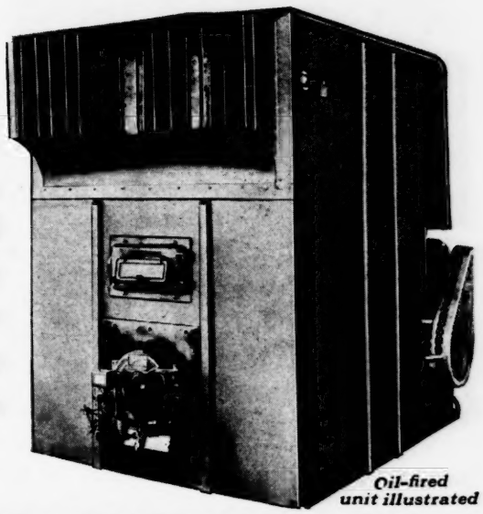
HEATERS, WATER
Direct-Fired

Coal-fired (C), Electric (E), Gas-fired (G), Oil-fired (O) Stoker-fired (S)

Adams Co., The, E. 4th St., Dubuque, Ia. (C)
Alberger Heater Co., 285 Chicago St., Buffalo, N. Y.
Aldrich Co., Wyoming, Ill. (O)
Pittsburgh, Pa. (C) (G) (O)
American Boiler & Foundry Co., Milan, Mich. (C) (O)
American Bosch Corp., 3664 Main St., Springfield, Mass. (G)
American Radiator & Standard Sanitary Corp., Bessemer Bldg., Pittsburgh, Pa. (C) (G)
Auburn Burner Co., Auburn, Ind. (O)
Autogas Co., 2258 Diversey Ave., Chicago, Ill. (G)
Automatic Burner Corp., 1823 Carroll Ave., Chicago, Ill. (O)
Bastian-Morley Co., Inc., 208-308 Truesdell Ave., La Porte, Ind. (E) (G)
Bethlehem Foundry & Machine Co., W. Second St., Bethlehem, Pa. (O)
Bigelow Co., The, 92 River St., New Haven, Conn.
Bros Boiler & Mfg. Co., Wm., Nicollet Island, Minneapolis, Minn. (C)
Bryant Heater Co., The, 17825 St. Clair Ave., Cleveland, O. (G)
Burnham Boiler Corp., Main St., Irvington, N. Y. (C)
Cleghorn Co., 86 Broad St., Boston, Mass. (C)
Cleveland Steel Products, Corp., Toridheet Div., Madison at W. 74th St., Cleveland, O. (O)
Conco Corporation, Mendota, Ill. (O)
Crane Co., 836 S. Michigan Ave., Chicago, Ill. (G)
Dahlquist Mfg. Co., Inc., 40 W. 3rd St., Boston, Mass. (G)
Delco Appliance Div., General Motors Sales Corp., Rochester, N. Y. (G) (O)
Dunham Co., C. A., 450 E. Ohio St., Chicago, Ill. (G)
Eastern Foundry Co., Peerless Heater Div., Spring & Schaeffer Sts., Boyertown, Pa. (C) (G)
Eclipse Fuel Engineering Co., 707 S. Main St., Rockford, Ill. (G)
Electric Furnace-Man, Inc., 101 Park Ave., New York, N. Y. (S)
Electrol, Inc., 934 Main St., Clifton, N. J. (O)
Fitzgibbons Boiler Co., 101 Park Ave., New York, N. Y. (C) (G) (O)
Fluid Heat Division, Anchor Post Fence Co., Eastern Ave., & Kane St., Baltimore, Md. (O)
General Fittings Co., 123 Georgia Ave., Providence, R. I.
General Oil Burner Corp., 1623 Asquith St., Baltimore, Md.
Gilbert & Barker Mfg. Co., Springfield, Mass. (O)
Glore Sales Corp., Evins F., 1939 Grand Central Terminal Bldg., New York, N. Y. (C) (O)
Handley Brown Heater Co., 209 E. Washington Ave., Jackson, Mich. (G)
Hart & Crouse Corp. 301 Turner St., Utica, N. Y. (C)

• You Can Amortize The Cost of This Warm Air Heating Plant in a Minimum of Time

The Directherm, Direct-Fired Warm Air Unit Heater For Plants of All Types



Oil-fired unit illustrated

300,000 to 1,500,000 BTU CAPACITY

- **DIRECTHERM WARM AIR HEATERS FOR OIL, GAS OR COAL** are available in six standard sizes with capacity from 300,000 to 1,500,000 Btu's. They are made of heavy gauge steel plate, with major sections all welded and flue gas headers are readily cleanable.
- **VENTILATION AND AIR RE-CIRCULATION.** The Directherm can be easily hooked up for outside air intake. Air filters may be used in the intake box when desired.
- **INSTALLATION.** These units, when assembled, require nothing more than a stack and an electrical connection (plus a gas or oil fuel hook-up) and can be made fully automatic in operation when using oil, gas or stoker.
- **PORTABILITY.** Directherm Heaters may be readily removed from one location to another or from one plant to another when building expansion programs demand such alterations in the heating system.
- **LOW INSTALLATION AND OPERATING COSTS.** Because of their low first cost, the investment in Directherm Warm Air Heaters can be amortized in a minimum of time and are thus particularly desirable for plants of possible semi-permanent utility. High efficiency of combustion with discharge of heat direct from the unit makes for low heating cost.

LEADING ARCHITECTS AND ENGINEERS

Endorse Warm Air Heating For Plants. The Directherm Warm Air Unit is ideal for industrial heating and will meet the requirements demanded of the new tendency to designate warm air installations for plant heating.

- **DUCT WORK.** While the Directherm Heater will provide thorough heat distribution without duct work, where necessity requires it may be hooked up with a system for further heat distribution. The fan equipment is of ample capacity to overcome duct resistances.

Factory Representatives. A few territories still open. Write for details.

ORDER NOW FOR PROMPT DELIVERY

AIRTHERM
MANUFACTURING COMPANY

722 S. SPRING AVE. • • ST. LOUIS, MO.

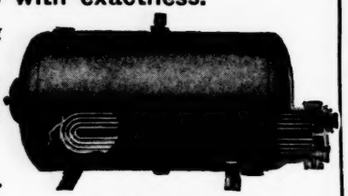
Guaranteed Performance Eliminates Your Risk

. . . You take no chances with Patterson Hot Storage Heaters for we'll furnish an iron-clad guarantee that they will supply all the hot water required, as hot as required, as quickly as required. Furthermore, we guarantee these heaters not to rust or cause red water.

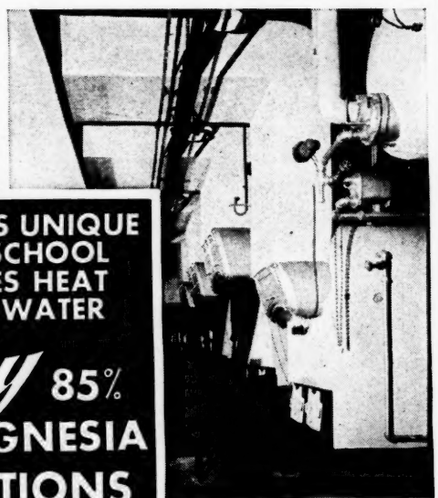
We can make such a guarantee because 60 years' experience enables us to work out all problems with exactness.

Write for catalog

The Patterson-Kelley Co., Inc.
105 Burson St.
East Stroudsburg, Pa.



Patterson Everdur or Copper-Lined Hot Water Heaters



BALTIMORE'S UNIQUE 7-STORY SCHOOL CONSERVES HEAT AND HOT WATER *with* Carey 85% MAGNESIA INSULATIONS

Baltimore's Patterson Park Junior High School is built seven stories high to accommodate 3,000 students on a ground area 355 by 142 feet. Among its unique features are automatic elevators, roof recreation areas and a simplified air conditioning and ventilation system.

Carey 85% Magnesia was used to insulate the four heating boilers, the breechings and the entire plumbing and heating equipment, including steam risers and exposed returns.

A nation-wide service and distribution organization will assist you in solving your insulation problems. Write Dept. 49 for Carey Insulation Catalog.

THE PHILIP CAREY COMPANY • Lockland, Cincinnati, Ohio
Dependable Products Since 1873
BRANCHES IN PRINCIPAL CITIES

Hotstream Heater Co., The, 8007 Grand Ave., Cleveland, O. (G) (O)
Hynes Electric Heating Co., 240 Cherry St., Phila., Pa. (E)
International Engineering Wks., Inc., Box 71, Framingham, Mass. (C) (G) (O)
International Heater Co., 101 Park Ave., Utica, N. Y. (C)
Johnston Bros., Inc., Ferrysburgh, Mich. (C)
Johnson Co., S. T., 940 Arlington St., Oakland, Cal. (G) (O)
Kewanee Boiler Corp., Kewanee, Ill. (C) (G) (O)
Kleen-Heet, Inc., 1823 Carroll Ave., Chicago, Ill. (O)
Koven & Brother, Inc., L. O., 154 Ogden Ave., Jersey City, N. J. (G) (O)
Little Burner Co., H. C., 2nd & Lincoln Ave., San Rafael, Cal. (O)
Littleford Bros., 421 E. Pearl St., Cincinnati, O. (O)
Lookout Boiler & Mfg. Co., Compress St. & Mfrs. Rd., Chattanooga, Tenn. (C)
Motor Wheel Corp., Duo-Therm Div., 701-735 E. Saginaw St., Lansing, Mich. (O)
Mueller Furnace Co., L. J., 2005 W. Oklahoma Ave., Milwaukee, Wis. (C) (G)
National Pipe Bending Co., 122 River St., New Haven, Conn. (C)
National Radiator Co., 221 Central Ave., Johnstown, Pa. (C) (G) (O)
Nu-Way Corp., 2416-4th Ave., Rock Island, Ill. (O)
Pacific Gas Radiator Co., 7615 Roseberry Ave., Huntington Park, Cal. (G)
Pacific Steel Boiler Div., United States Radiator Corp., 1056 First National Bank Bldg., Detroit, Mich. (C) (O)
Pan American Engineering Co., 820 Parker St., Berkeley, Cal.
Penn Boiler & Burner Mfg. Corp., Lancaster, Pa.
Pierce, Butler Radiator Corp., 701 Nichols Ave., Syracuse, N. Y. (C)
Pittsburgh Water Heater Co., Box 1109, Pittsburgh, Pa. (G)
Porcupine Co., Bridgeport, Conn. (E)
Preferred Utilities Mfg. Corp., 33 W. 60th St., New York, N. Y. (O)
Prox Co., Inc., Frank, 1201 S. First St., Terre Haute, Ind. (C)
Ray Oil Burner Co., 401-499 Bernal Ave., San Francisco, Cal. (O)
Reif-Rexoil, Inc., 37-43 Carroll St., Buffalo, N. Y. (O)
Richmond Radiator Co., Gas Products Div., Uniontown, Pa. (G)
Rotary Mfg. Co., 5718 Long Beach Ave., Los Angeles, Cal. (G)
Round Oak Co., Dowagiac, Mich. (C) (G) (O)
Rudy Furnace Co., Lock Box 60, Dowagiac, Mich. (C)
Ruud Mfg. Co., 2934 Smallman St., Pittsburgh, Pa. (G)
Schoedinger, F. O., 322-358 Mt. Vernon Ave., Columbus, O. (G)
Schwitzer-Cummins Co., Fan St., Indianapolis, Ind. (S)
Scott-Newcomb, Inc., 1922 Pine St., St. Louis, Mo. (O)
Smith Co., Inc., H. B., The, 57 Main, Westfield, Mass. (C) (O)
Spencer Heater Div., Aviation Mfg. Corp., 164 Park St., Williamsport, Pa. (C) (O)
Stack Heater Co., The, 250 Stuart St., Boston, Mass.
Stokermatic Co., The, 1415 S. State St., Salt Lake City, Utah. (C)
Sullivan Valve & Engineering Co., 910 S. Arizona St., Butte, Mont. (G)
Thatcher Furnace Co., 39 St. Francis St., Newark, N. J. (C)
Timken Silent Automatic Div. Timken-Detroit Axle Co., 100-400 Clark Ave., Detroit, Mich. (O)
Troop Water Heater Co., 2516-2526 Jane St., Pittsburgh, Pa. (G)
United States Radiator Corp., 1056 National Bank Bldg., Detroit, Mich. (G) (O)
Vapor Car Heating Co., Inc., 80 E. Jackson Blvd., Chicago, Ill. (O)
Viking Mfg. Co., 12600 Greenfield Rd., Detroit, Mich. (O)
Weil-McLain Co., 641 W. Lake St., Chicago, Ill. (C)
Westinghouse Electric & Mfg. Co., Springfield, Mass. (C) (G) (O)
York Oil Burner Co., Inc., P.R.R. & Jessup Pl., York, Pa. (O)

HEATERS, WATER

Indirect

Akwa Heaters, Inc., 1955 Park Ave., New York, N. Y.
Alberger Heater Co., 285 Chicago St., Buffalo, N. Y.
American District Steam Co., Bryant St., North Tonawanda, N. Y.
American Radiator & Standard Sanitary Corp., Bessemer Bldg., Pittsburgh, Pa.
Automatic Stoker Corp., 2427 W. North Ave., Milwaukee, Wis.
Bell & Gossett Co., 3000 Wallace St., Chicago, Ill.
Bryan Steam Corp., P. O. Box 337, Peru, Ind.
Bryant Heater Co., 17825 St. Clair Ave., Cleveland, O.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Croll-Reynolds Engineering Co., Inc., 17 John St., New York, N. Y.
Davis Engineering Corp., 1064 E. Grand St., Elizabeth, N. J.
Ferguson & Lange Foundry Co., 1039 Willow St., Chicago, Ill.
Fitzgibbons Boiler Co., Inc., 101 Park Ave., New York, N. Y.
Frank Heaters, Inc., 150 Railroad Ave., Paterson, N. J.
General Fittings Co., 123 Georgia Ave., Providence, R. I.
Hotstream Heater Co., The, 8007 Grand Ave., Cleveland, O.
Kehm Corp., The, 441 N. La Salle St.—51 E. Grand Ave., Chicago, Ill.
Koven & Brother, Inc., L. O., 154 Ogden Ave., Chicago, Ill.
Little Mfg. Co., M. S., 151 New Park Ave., Hartford, Conn.
Marion Machine Foundry & Supply Co., Marion, Ind.
National Pipe Bending Co., 122 River St., New Haven, Conn.
Patterson-Kelley Co., Inc., East Stroudsburg, Pa.
Porcupine Co., Bridgeport, Conn.
Radiator Specialty Co., Charlotte, N. C.
Richmond Engineering Co., Inc., 7th and Hospital Sts., Richmond, Va.
Stack Heater Co., The, 250 Stuart St Boston, Mass.
Sterling, Inc., 3738 N. Holton St., Milwaukee, Wis.
Taco Heaters, Inc., 342 Madison Ave., New York, N. Y.
Thrush & Co., H. A., 21 E. Riverside Drive, Peru, Ind.
Vapor Car Heating Co., Inc., 80 E. Jackson Blvd., Chicago, Ill.
Watts Regulator Co., 10 Embankment St., Lawrence, Mass.

HEATERS, WATER

Steam

Instantaneous (I), Storage (S)

Akwa Heaters, Inc., 1955 Park Ave., New York, N. Y. (I) (S)
Alberger Heater Co., 285 Chicago St., Buffalo, N. Y.
American District Steam Co., Bryant St., North Tonawanda, N. Y. (I) (S)
Bastian-Morley Co., Inc., 208-308 Truesdell Ave., La Porte, Ind. (S)
Bell & Gossett Co., 3000 Wallace St., Chicago, Ill. (I) (S)
Bigelow Co., The, 92 River St., New Haven, Conn. (S)
Bros Boiler & Mfg. Co., Wm., Nicollet Island, Minneapolis, Minn. (S)
Buffalo Forge Co., 171 Mortimer St., Buffalo, N. Y.
Burnham Boiler Corp., Main St., Irvington, N. Y. (S)
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Croll-Reynolds Engineering Co., Inc., 17 John St., New York, N. Y. (I)
Dahlquist Mfg. Co., Inc., 40 W. 3rd St., Boston, Mass. (I) (S)
Davis Engineering Corp., 1064 E. Grand St., Elizabeth, N. J. (I)

KISCO

V-Type "Q-T" HEAT Recirculator

SINGLE UNIT!
SINGLE INSTALLATION!
SINGLE MOTOR!
but DOUBLE CAPACITY!

Reduces the Number of Units Required to Heat Large Areas

A Rugged, big capacity Heat Recirculator designed especially for installations in large spaces such as warehouses, garages, auditoriums, stores and offices. Instead of a single warm air stream, the V-Type "Q-T" Heat Recirculator projects two streams of heated air at right angles to each other.
P.S. "Q-T" means Really Quiet.

Big Savings in Cost and Operation

Only one motor, one fan and one inlet and outlet connection is employed. Original cost, installation expense and operating costs are minimized and a marked saving is made in piping, fittings and electrical conduit.
Write for complete information—Specify Bulletin PQV-9.

KISCO "Q-T" EXHAUSTERS

New scientifically designed overlapping blades. Powerful motors, resiliently rubber mounted. For all year 'round quiet, dependable ventilation specify Kisco "Q-T". Ask for Bulletin PL-9.
Investigate Kisco CIRCULAIRS . . . Air Recirculators for Offices, Homes, Stores

Kisco Standard "Q-T" Heat Recirculator

Thousands of these rugged, dependable units are in use from coast to coast. An entirely New principle of construction provides great structural strength so necessary for high steam pressure. Alert architects and engineers who know have recognized the superiority of Kisco "Q-T" Heat Recirculators over ordinary Unit Heaters. If you investigate, you'll specify Kisco "Q-T" for quiet, economical and dependable heating.
Write for Complete Details and Specifications—Bulletin PQ-9.

Manufacturers of Heating, Cooling and Ventilating Equipment

TERRITORY OPEN

A few select territories are open for the right men to handle the entire line of Kisco heating, cooling and ventilating equipment.

KISCO COMPANY, INC.

39th St. and Chouteau Ave. St. Louis, Mo.

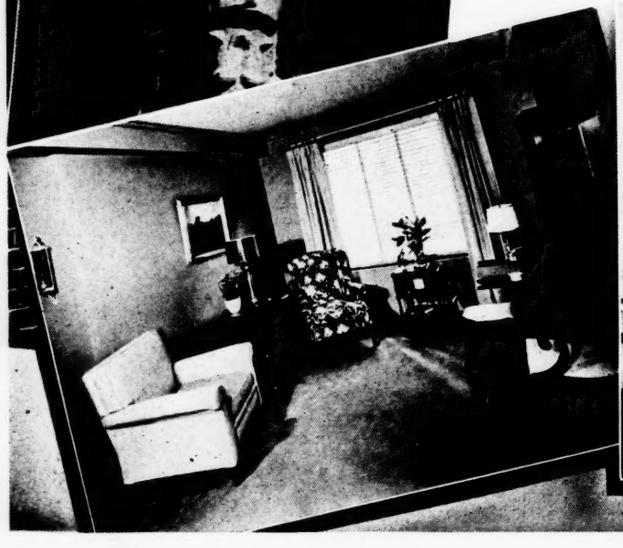
40,000

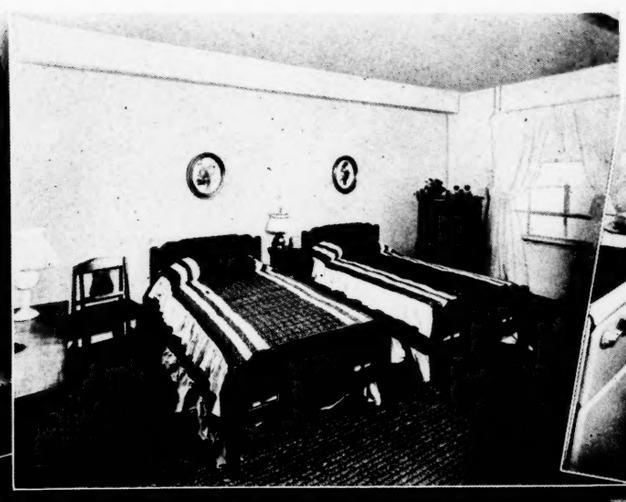
Comfort Conditioned

The $50,000,000 Parkchester Community, erected by private capital, is the largest housing project ever conceived and carried through as a single plan. It will serve as a permanent monument to the vision of the Metropolitan Life Insurance Company whose vast resources in this way are made to serve thousands of middle-income families.

The Dunham system of Sub-atmospheric steam heating contributes its part to the health and comfort of this American Community of more than 12,000 families as it does across the country wherever families live in numbers under one roof—and in business, institutional and industrial plants in practically every state in the Union.

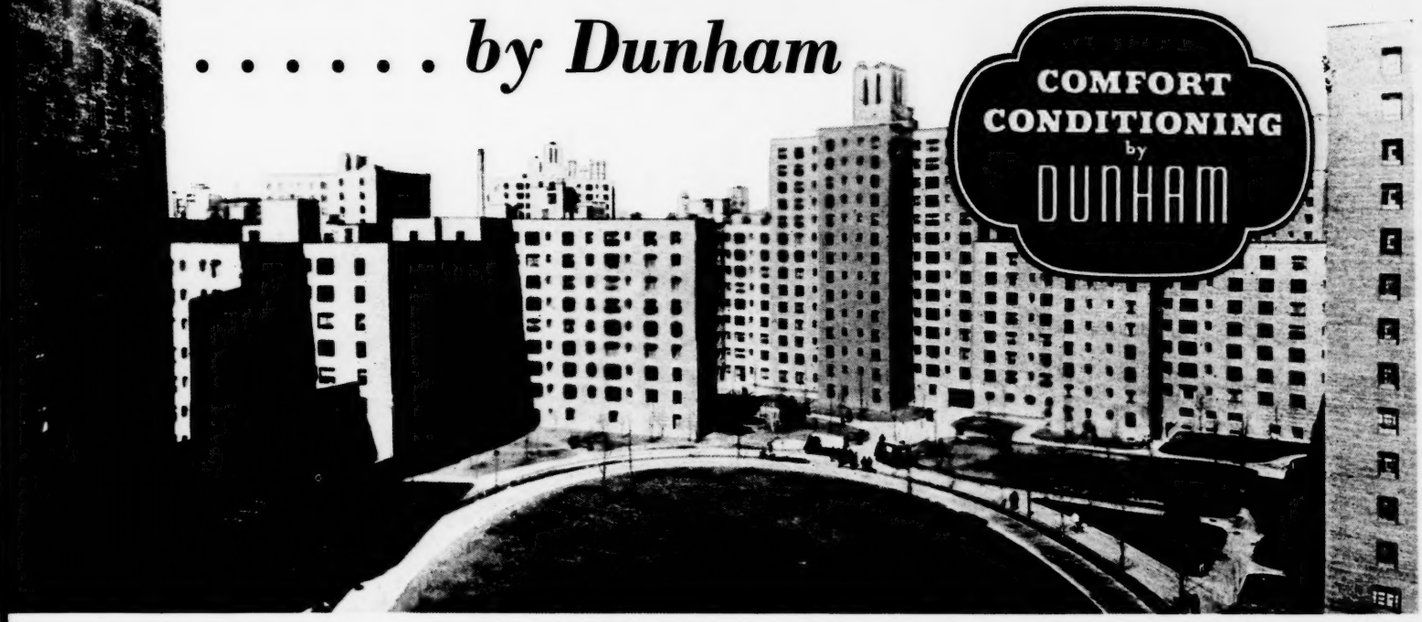
Comfort Conditioning by Dunham provides perfectly controlled balance between "heat need" and "heat supply." It is important to management because of its consistent comfort-level heat on minimized fuel or steam costs. It is important to tenants because without any attention to valves or windows, they are comfortable in mild as well as in cold weather.





NEIGHBORS

. . . . . by Dunham



A FEW OF THE INTERESTING DETAILS IN PARKCHESTER COMMUNITY

Fifty-one apartment buildings from 6 to 12 stories.
Buildings occupy 35½ acres of a total of 129 acres.
Project contains five park areas, large theatre, five garages, a major shopping center and several groups of neighborhood stores.
Area approximates 46 city blocks.
Partially complete now, Parkchester will be fully completed in 1941.

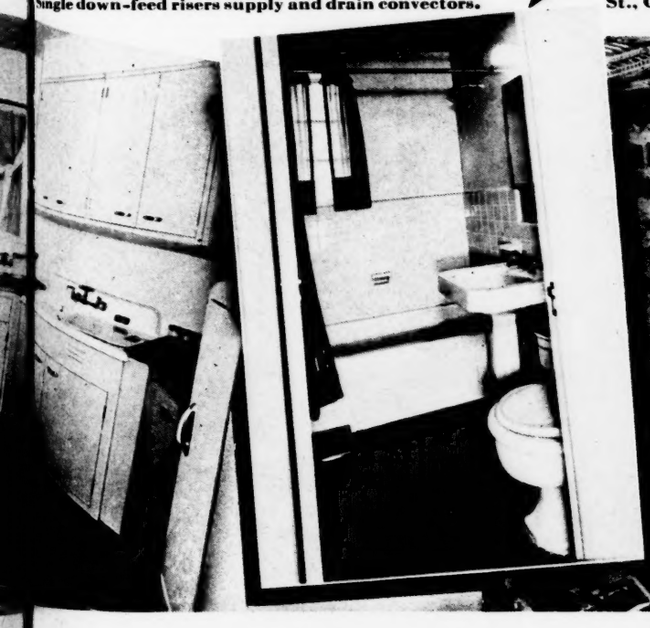
DUNHAM SUB-ATMOSPHERIC STEAM HEATING SYSTEM

Operating Pressures from 25″ Vacuum (133°F) to 2 lbs. gauge pressure (218°F).
Steam from the high pressure central heating plant reduced to 5 lbs. at Pressure Reducing Valve in each building.
Up-feed risers utilized for heat.
Single down-feed risers supply and drain convectors.
New design convector enclosures fitted with dampers for control of heat output within maximum limit of thermostatic control.

For complete technical data on Parkchester Community, write for Bulletin File 1M—C. A. Dunham Co., 450 E. Ohio St., Chicago.

TYPICAL INSTALLATIONS OF DUNHAM *Sub-atmospheric Steam* HEATING

Rockefeller Center, New York
Commodore Hotel, New York
Public Library, Providence, R. I.
Grant Building, Pittsburgh
Bausch & Lomb Optical Co., Rochester, N. Y.
Eastman Kodak Co., Rochester, N. Y.
Lakeside Hospital, Cleveland
Mundelein College, Chicago
Edgewater Beach Hotel, Chicago
Dierks Building, Kansas City
Standard Oil Co., Omaha, Nebr.
Smith Young Tower, San Antonio, Texas
Pacific Nat'l. Bank, San Francisco
Exchange Building, Seattle



Eclipse Fuel Engineering Co., 707 S. Main St., Rockford, Ill. (I)
Fitzgibbons Boiler Co., Inc., 101 Park Ave., New York, N. Y. (I) (S)
Frank Heaters, Inc., 150 Railroad Ave., Paterson, N. J. (I) (S)
General Fittings Co., 123 Georgia Ave., Providence, R. I. (I) (S)
General Furnace Corp., 17 State St., New York, N. Y. (I)
Gerstein & Cooper Co., 1 W. Third St., South Boston, Mass. (I) (S)
Hasco Valve & Machine Co., 1819 W. St. Paul Ave., Milwaukee, Wis. (I)
Howard Iron Wks. & Alberger Heater Co., 287 Chicago St., Buffalo, N. Y. (I) (S)
Hynes Electric Heating Co., 240 Cherry St., Philadelphia, Pa. (S)
International Engineering Wks., Inc., Box 71, Framingham, Mass. (S)
Johnson Corp., 830 Wood St., Three Rivers, Mich. (I) (S)
Kewanee Boiler Corp., Kewanee, Ill. (I)
Koven & Brother, Inc., L. O., 154 Ogden Ave., Jersey City, N. J. (S)
Manitowoc Boiler Wks., 16th & The River, Manitowoc, Wis. (S)
Marion Machine Foundry & Supply Co., Marion, Ind. (I)
Milwaukee Reliance Boiler Wks., 2784 N. 32nd St., Milwaukee, Wis. (S)
National Pipe Bending Co., 122 River St., New Haven, Conn. (I) (S)
Patterson-Kelley Co., Inc., 102 Burson St., East Stroudsburg, Pa. (I) (S)
Quaker City Iron Works, Allegheny & Tulip Sts., Philadelphia, Pa. (I) (S)
Richmond Engineering Co., Inc., 7th and Hospital Sts., Richmond, Va. (I) (S)
Rockwood Sprinkler Co., 38 Harlow St., Worcester, Mass. (S)
Ross Heater & Mfg. Co., Inc., 1407 West Ave., Buffalo, N.Y. (I) (S)
Rotary Mfg. Co., 5718 Long Beach Ave., Los Angeles, Cal. (S)
Schutte & Koerting Co., 12th & Thompson Sts., Philadelphia, Pa. (I)
Sims Co., 18th & Whitley Sts., Erie, Pa. (I) (S)
Stack Heater Co., The, 250 Stuart St., Boston, Mass. (I)
Sterling, Inc., 3738 N. Holton St., Milwaukee, Wis. (I)
Sturtevant Co., B. F., Damon St., Hyde Park, Boston, Mass.
Super Radiator Corp., 320 Plymouth Bldg., Minneapolis, Minn. (I) (S)
Swartwout Co., 18511 Euclid Ave., Cleveland, O. (I)
Taco Heaters, Inc., 342 Madison Ave., New York, N. Y. (I) (S)
Troop Water Heater Co., 2516-2526 Jane St., Pittsburgh, Pa. (I)
Vogt Machine Co., Henry, 10th & Ormsby Sts., Louisville, Ky. (S)
Watts Regulator Co., 10 Embankment St., Lawrence, Mass. (I) (S)
Whitehead Metal Products Co., of New York, Inc., 303 W. 10th St., New York, N. Y. (S)
Whitlock Mfg. Co., 100 South St., Hartford, Conn. (I) (S)

HEATING INSULATION

(See Insulation, Thermal)

HEATING SYSTEMS

Hot Water

Airtemp, Div. of Chrysler Corp. Leo St., Dayton, O.
American Boiler & Foundry Co., Milan, Mich.
Bell & Gossett Co., 3000 Wallace St., Chicago, Ill.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
General Blower Co., Inc., 2402 Market St., Philadelphia, Pa.
General Fittings Co., 123 Georgia Ave., Providence, R. I.
Hoffman Specialty Co., Inc., Waterbury Natl. Bank Bldg., Waterbury, Conn.
Kainer & Co., 761 W. Lexington, Chicago, Ill.
Kehm Corp., The, 441 N. La Salle St.—51 E. Grand Ave., Chicago, Ill.
Lawler Automatic Controls, Inc., 453 N. MacQuesten Pkwy., Mount Vernon, N. Y.
Milwaukee Valve Co., S. Burrell St. at E. Hayes Ave., Milwaukee, Wis.
Nugent Sons, Inc., Thos., 223 E. 80th St., New York, N. Y.
Penberthy Injector Co., 1242 Holden Ave., Detroit, Mich.
Pierce Butler Radiator Corp., 701 Nichols Ave., Syracuse, N. Y.
Richmond Radiator Co., Gas Products Div., Uniontown, Pa.
Sarco Co., Inc., 183 Madison Ave., New York, N. Y.
Sterling, Inc., 3738 N. Holton St., Milwaukee, Wis.
Sullivan Valve & Engineering Co., 910 S. Arizona St., Butte, Mont.
Thrush & Co., H. A., 21 E. Riverside Dr., Peru, Ind.
Trane Co., The, La Crosse, Wis.
Triplex Heating Specialty Co., Inc., 131 Canal St., Peru, Ind.
Triplex Mfg. Co., Peru, Ind.
Watts Regulator Co., 10 Embankment St., Lawrence, Mass.

Vacuum

Barnes & Jones, Inc., 128 Brookside Ave. Jamaica Plain, Boston, Mass.
Cashin, W. D., 69 A St., Boston, Mass.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Dunham Co., C. A., 450 E. Ohio St., Chicago, Ill.
Herske & Timmis, Inc., 33 W. 60th St., New York, N. Y.
Hoffman Specialty Co., Inc., Waterbury Natl. Bank Bldg., Waterbury, Conn.
Illinois Engineering Co., 2035 S. Racine Ave., Chicago, Ill.
Marsh, Corp., Jas. P., 2089 Southport Ave., Chicago, Ill.
McAlear Mfg. Co., 1901-1909 S. Western Ave., Chicago, Ill.
Milwaukee Valve Co., S. Burrell St. at E. Hayes Ave., Milwaukee, Wis.
Monash-Younker Co., 1315 W. Congress St., Chicago, Ill.
Mouat Vapor Heating Co., The, 1246-1254 W. 4th St., Cleveland, O.
Pierce Butler Radiator Corp., 701 Nichols Ave., Syracuse, N. Y.
Richmond Radiator Co., Gas Products Div., Uniontown, Pa.
Sarco Co., Inc., 183 Madison Ave., New York, N. Y.
Sterling, Inc., 3738 N. Holton St., Milwaukee, Wis.
Stickle Steam Specialties Co., 2215 Valley Ave., Indianapolis, Ind.
Trane Co., The, La Crosse, Wis.
Webster & Co., Warren, 17th & Federal Sts., Camden, N. J.

HEATING SYSTEMS

Vapor

American District Steam Co., Bryant St., North Tonawanda, N. Y.
Barnes & Jones, Inc., 128 Brookside Ave., Jamaica Plain, Boston, Mass.
Cashin Co., W. D., 69 A Street, Boston, Mass.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Dunham Co., C. A., 450 E. Ohio St., Chicago, Ill.
Gorton Heating Corp., Cranford, N. J.
Herske & Timmis, Inc., 33 W. 60th St., New York, N. Y.
Hoffman Specialty Co., Inc., Waterbury Natl. Bank Bldg., Waterbury, Conn.
Illinois Engineering Co., 2035 S. Racine Ave., Chicago, Ill.
McAlear Mfg. Co., 1901-1909 S. Western Ave., Chicago, Ill.

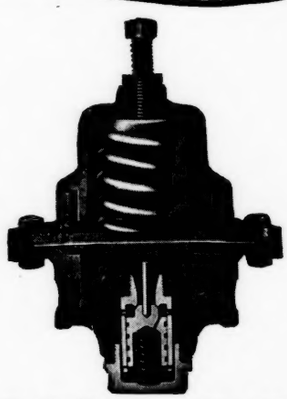
PRESSURE REGULATORS FOR EVERY PURPOSE

No. 15—This is a ba'anced, counterweighted diaphragm type regulator especially designed to give sensitive low pressure regulation on vapor heating systems. Unaffected by supply pressure variations. Packing boxes are eliminated: hence no leakage, no stem friction.

THE Davis line of automatic pressure reducing valves is complete—there is a type and size available to fit any job whether it be on steam, air, gas, water, or oil. The line includes a full range of regulators suitable for dead-end service as well as continuous flow. Davis recommendations are not biased by any favored types. As the job dictates, you are free to choose between direct or pilot control... spring or weight loading... piston or diaphragm action. Standard sizes range from ⅜ in. to 24 in. for pressures up to 1,500 lbs. Larger sizes available on special order. You have your choice of the degree of sensitivity needed for the job—you don't have to pay for more than you need.

• • •

CHOOSING the right size and style is made easy by the Davis Regulator Service Chart and Capacity Charts. Specifications and ratings according to service. Write for copies or see them at your jobber's. DAVIS REGULATOR COMPANY, 2553 S. Washtenaw Ave., Chicago, Ill.



No. 13—Truly the modern regulator for unit heaters, water heaters, laundry ironers, sterilizers, vulcanizers, etc. Spring cap removable by hand—Built-in strainer—All parts accessible without breaking pipe connections — Tight closing — For steam, air or gas service.

DAVIS VALVES

DAVIS REGULATOR CO.

PRESSURE REGULATORS • STOP AND CHECK VALVES • LIQUID LEVEL CONTROLLERS • BACK PRESSURE VALVES
STRAINERS • PUMP GOVERNORS • BUTTERFLY VALVES • FLOAT VALVES • RELIEF VALVES • SOLENOID VALVES
MOTOR OPERATED VALVES • NON-RETURN VALVES

ILLINOIS HEATING SYSTEMS

Vacuum • Vapor • Selective Pressure Control
Continuous Flow Control • Intermittent Flow Control

ILLINOIS HEATING SYSTEMS, with and without control, fall under five general types and cover the complete range of heating requirements; and each admits of special variations to meet any condition, whether for heating or process work.

STEAM POWER SPECIALTIES

In addition to low pressure specialties, we manufacture complete lines of steam specialties for medium and high pressures.

No matter what your steam handling problem may be, our specialists will be glad to assist and give you every cooperation. Write us or phone the nearest representative in our nation-wide service.

ILLINOIS ENGINEERING COMPANY
2047 SOUTH RACINE AVENUE, CHICAGO

Milwaukee Valve Co., S. Burrell St., at E. Hayes Ave., Milwaukee, Wis.
Pierce Butler Radiator Corp., 701 Nichols Ave., Syracuse, N. Y.
Richmond Radiator Co., Gas Products Div., Uniontown, Pa.
Sterling, Inc., 3738 N. Holton St., Milwaukee, Wis.
Trane Co., The, La Crosse, Wis.
Vapor Specialty Co., 101 W. 42nd St., New York, N. Y.
Webster & Co., Warren, 17th & Federal Sts., Camden, N. J.

HEATING SYSTEMS
Zone Control
(See Controls, Zone)

HOSE, METAL
American Brass Co., 414 Meadow St., Waterbury, Conn.
American Metal Hose Branch, American Brass Co., 67 Jewelry St., Waterbury, Conn.
Atlantic Metal Hose Co., Inc., 123 W. 64th St., New York, N. Y.
Chicago Metal Hose Corp., 1300 S. 3rd St., Maywood, Ill.
Eclipse Aviation, Div. of Bendix Aviation Corp., Bendix, N. J.
Seamlex Co., Inc., 5-18 48th Ave., Long Island City, N. Y.
Titeflex Metal Hose Co., 500 Frelinghuysen Ave., Newark, N. J.
United Metal Hose Co., Inc., 36-01 43rd Ave., Long Island City, N. Y.

HOT WATER CIRCULATORS
(See Circulators for Hot Water Heating Systems)

HOT WATER HEATING SYSTEMS
(See Heating Systems, Hot Water)

HOT WATER PRESSURE REGULATORS
(See Regulators, Pressure, for Hot Water Heating Systems)

HUMIDIFIERS
Central, Furnace Type
Evaporative (E), Spray (S), Target (T)

Air Controls, Inc., 9205 Detroit Ave., Cleveland, O. (S)
American Furnace & Foundry Co., Milan, Mich. (E)
Anetsberger Bros., 3505 Elston St., Chicago, Ill.
Automatic Humidifier Co., 19th & Main Sts., Cedar Falls, Ia. (E)
Binks Mfg. Co., 3114 Carroll Ave., Chicago, Ill. (S)
Bishop & Babcock Mfg. Co., 4901 Hamilton Ave., Cleveland, O. (S)
Bishop Humidifier Co., 8011 Dexter Blvd., Detroit, Mich. (E)
Brundage Co., 510 N. Park St., Kalamazoo, Mich. (S)
Bryant Heater Co., 17825 St. Clair Ave., Cleveland, O. (E) (S)
Cary Mfg. Co., Churchill St., Waupaca, Wis. (E)
Chandler Co., 804 1st Ave., N. W., Cedar Rapids, Ia. (E)
Chelsea Fan & Blower Co., Inc., 370 W. 15th St., New York, N. Y. (S)
Dowagiac Steel Furnace Co., Beeson St., Dowagiac, Mich. (E)
Excelsior Steel Furnace Co., The, 118 S. Clinton St., Chicago, Ill. (E)
General Electric Co., Air Conditioning & Commercial Ref. Dept., Bloomfield, N. J.
Green Colonial Furnace Co., 322 S. W. Third St., Des Moines, Ia. (E)
Hall-Neal Furnace Co., 1324 N. Capitol Ave., Indianapolis, Ind.
Health-O-Mist Humidifier Mfg. Co., James St., Columbus, Wis. (E)
Henry Furnace & Foundry Co., 3473 E. 49th St., Cleveland, O. (E)
Home Furnace Co., 6th St. & P. M. R. R., Holland, Mich. (E)
Kleenaire Corp., 409 Jefferson St., Stevens Point, Wis. (E)
Lennox Furnace Co., Inc., Syracuse, N. Y., & Marshalltown, Ia. (E)
Little Burner Co., Inc., H. C., 2nd & Lincoln, San Rafael, Cal. (E)
Lohman, Inc., Wm. J., 62 Ninth Ave., New York, N. Y.
Lowell Air Conditioning Corp., Otis Bldg., Philadelphia, Pa. (E)
Maid-O'-Mist, Inc., 215 N. Aberdeen St., Chicago, Ill. (E)
Marshall Furnace Co., Hanover & Dobbins St., Marshall, Mich. (E) (S)
Mayflower Air-Conditioners, Inc., Duluth Ave. & E. Seventh St., St. Paul, Minn. (E) (S)
McDonnell & Miller, Wrigley Bldg., Chicago, Ill.
Meyer Furnace Co., The, 1300 S. Washington St., Peoria, Ill. (E) (S)
Monmouth Products Co., 1929-41 E. 61st St., Cleveland, O. (E)
Mountain States Equipment Co., 1238 Speer Blvd., Denver, Colo. (S)
Mueller Furnace Co., L. J., 2005 W. Oklahoma Ave., Milwaukee, Wis. (E)
Nugent Sons, Inc., Thos., 223 E. 80th St., New York, N. Y. (E)
Olsen Mfg. Co., C. A., Elyria, O. (S)
Payne Furnace & Supply Co., 338 N. Foothill Rd., Beverly Hills, Cal. (S)
Pennsylvania Furnace & Iron Co., P. O. Box 269, Warren, Pa. (E)
Premier Furnace Co., Box 150, Dowagiac, Mich. (E)
Rega Mfg. Co., 79 Mt. Hope Ave., Rochester, N. Y. (S)
Richardson & Boynton Co., 274 Madison Ave., New York, N. Y. (E)
Rockford Brass Works, 700 S. Main St., Rockford, Ill. (E)
Round Oak Co., Dowagiac, Mich. (E)
Rudy Furnace Co., Lock Box 60, Dowagiac, Mich. (E)
Sioux City Foundry and Boiler Co., E. 8th & Division Sts., Sioux City, Ia. (E)
Skilbeck Mfg. Co., 7432 27th Ave., Kenosha, Wis. (E)
Skuttle Co., J. L., 999 Franklin St., Detroit, Mich. (E)
Somers, Inc., H. J., 6063 Wabash Ave., Detroit, Mich. (E) (S)
Southworth Machine Co., 30 Warren Ave., Portland, Me. (S)
Spray Engineering Co., 114 Central St., Somerville, Mass. (S)
Spray-Wheel Air Conditioners, Inc., 1320 Nineteenth St., Denver, Colo. (S)
Steamaire Co., Cincinnati, O.
Supreme Electric Products Corp., 99 Mt. Hope Ave., Rochester, N. Y. (S)
Thatcher Furnace Co., 39 St. Francis St., Newark, N. J. (E) (S)
Trane Co., The, La Crosse, Wis.
U. S. Air Conditioning Corp., 2101 Kennedy St., N. E., Minneapolis, Minn. (S)
Universal Blower Co., 124 S. Woodward Ave., Birmingham, Mich. (E)
Viking Air Conditioning Corp., 9500 Richmond Ave., Cleveland, O. (E)
Western Blower Co., 1800 Airport Way, Seattle, Wash. (E)
Westinghouse Electric & Mfg. Co., Springfield, Mass. (E)
Woolery Machine Co., 2919 Como Ave., S. E., Minneapolis, Minn.

HUMIDIFIERS
Central, Industrial Type

Air & Refrigeration Corp., 11 W. 42nd St., New York, N. Y.
American Blower Corp., 6000 Russell St., Detroit, Mich.
Armstrong Machine Works, 874 Maple St., Three Rivers, Mich.
Baker Ice Machine Co., Inc., 1508 Evans St., Omaha, Neb.
Brundage Co., 514 N. Park St., Kalamazoo, Mich.
Carrier Corp., 302 S. Geddes St., Syracuse, N. Y.
Johnson Service Co., 507 E. Michigan St., Milwaukee, Wis.
Mellish & Murray Co., 1715 Carroll Ave., Chicago, Ill.
Minneapolis-Honeywell Regulator Co., 2701 Fourth Ave., South, Minneapolis, Minn.
Monmouth Products Co., 1929-41 E. 61st St., Cleveland, O.
Parks-Cramer Co., 970 Main St., Fitchburg, Mass.
Patten Co., J. V., 500 De Kalb Ave., Sycamore, Ill.
Powers Regulator Co., 2720 Greenview Ave., Chicago, Ill.
Research Corp., Chrysler Bldg., New York, N. Y.
Ross Engineering Corp., J. O. 350 Madison Ave., New York, N. Y.
Southworth Machine Co., 30 Warren Ave., Portland, Me.
Steamaire Co., Cincinnati, O.
Strandwitz & Co., Inc., W. J., Jefferson and Master Sts., Camden, N. J.
Sturtevant Co., B. F., Damon St., Hyde Park, Boston, Mass.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.
Trane Co., The, La Crosse, Wis.

HUMIDIFIERS
Radiator Attachment Type

Acme Tin Plate & Roofing Supply Co., 3rd & Westmoreland Sts., Philadelphia, Pa.
Lowell Air Conditioning Corp., Otis Bldg., Philadelphia, Pa.
Maid-O'-Mist, Inc., 215 Aberdeen St., Chicago, Ill.
Richmond Radiator Co., Gas Products Div., Uniontown, Pa.
Skilbeck Mfg. Co., 7432—27th Ave., Kenosha, Wis.

HUMIDIFIERS
Room Cabinet Type

Autogas Co., 2258 Diversey Ave., Chicago, Ill.
Betz Air Conditioning Corp., 1820 Wyandotte St., Kansas City, Mo.
Coolmaster Corp., 530 S. Dearborn St., Chicago, Ill.
Corozone Air Conditioning Corp., 1422 Euclid Ave., Cleveland, O.
Cugley Incubator Co., Elkhart, Ind.
Hugo Mfg. Co., 49th Ave., W., & Superior St., West Duluth, Minn.
Kauffman Air Conditioning Corp., 4336 W. Pine Blvd., St. Louis, Mo.
Lion Mfg. Corp., 2701-11 Belmont Ave., Chicago, Ill.
Lohman, Inc., Wm. J., 62 Ninth Ave., New York, N. Y.
Mountain States Equipment Co., 1238 Speer Blvd., Denver, Colo.
National Standard Air Products Co., 325 W. Huron St., Chicago, Ill.
Norwood Filtration Co., The, N. Maple St., Florence, Mass.
Sheer Co., H. M., Second & Hampshire Sts., Quincy, Ill.
Skilbeck Mfg. Co., 7432—27th Ave., Kenosha, Wis.
Somers, Inc., H. J., 6063 Wabash Ave., Detroit, Mich.
Southworth Machine Co., 30 Warren Ave., Portland, Me.
Standard Air Conditioning, Inc., 50 W. 40th St., New York, N. Y.
Standard Engineering Wks., 289 Roosevelt Ave., Pawtucket, R. I.
Steamaire Co., Cincinnati, O.
U. S. Air Conditioning Corp., 2101 Kennedy St., N. E., Minneapolis, Minn.
Vigor-Air Corp., 127 S. 5th St., Philadelphia, Pa.

HUMIDIFIERS
Room Spray, Industrial Type

American Moistening Co., 260 W. Exchange St., Providence, R. I.
Anetsberger Bros., 3505 Elston Ave., Chicago, Ill.
Bahnson Co., R. J., Reynolds Bldg., Winston-Salem, N. C.
Baker Ice Machine Co., Inc., 1508 Evans St., Omaha, Neb.
Betz Air Conditioning Corp., 1820 Wyandotte St., Kansas City, Mo.
Binks Mfg. Co., 3114-40 Carroll Ave., Chicago, Ill.
Blower Application Co., 918 N. Fourth St., Milwaukee, Wis.
Buffalo Forge Co., 171 Mortimer St., Buffalo, N. Y.
Chelsea Fan & Blower Co., 370 W. 15th St., New York, N. Y.
International Moistening Co., 489 S. Main St., Providence, R. I.
Lohman, Inc., Wm. J., 62 Ninth Ave., New York, N. Y.
Manufacturers Machine Co., Railroad Ave., North Andover, Mass.
Marley Co., 3001 Fairfax Rd., Kansas City, Mo.
Mellish & Murray Co., 1715 Carroll Ave., Chicago, Ill.
Mountain States Equipment Co., 1238 Speer Blvd., Denver, Colo.
Murray Mfg. Co., D. J., 1002-24 Third St., Wausau, Wis.
New York Blower Co., 3155 Shields Ave., Chicago, Ill.
Parks-Cramer Co., 970 Main St., Fitchburg, Mass.
Pfening Co., Fred D., The, 1075 W. 5th Ave., Columbus, O.
Rhode Island Humidifier & Ventilating Co., 99 Chauncey St., Boston, Mass.
Somers, Inc., H. J., 6063 Wabash Ave., Detroit, Mich.
Southworth Machine Co., 30 Warren Ave., Portland, Me.
Spray Engineering Co., 114 Central St., Somerville, Mass.
Spraying Systems Co., 4033 W. Lake St., Chicago, Ill.
Standard Engineering Wks., 289 Roosevelt Ave., Pawtucket, R. I.
Steamaire Co., Cincinnati, O.
Supreme Electric Products Corp., 99 Mt. Hope Ave., Rochester, N. Y.
Walton Laboratories, Inc., 1186 Grove St., Irvington, N. J.

HUMIDIFYING RADIATORS
(See Radiators, Humidifying)

HUMIDISTAT
(See Controls, Humidity)

HUMIDITY CONTROLS
(See Controls, Humidity)

HUMIDITY RECORDERS
(See Recorders, Humidity, and Recorders, Temperature and Humidity)

HYGROMETERS

American Moistening Co., 260 W. Exchange St., Providence, R. I.
Bahnson Co., R. J., Reynolds Bldg., Winston-Salem, N. C.
Bristol Co., Platts Bridge, Waterbury, Conn.
Brown Instrument Co., Div. Of Minneapolis-Honeywell Regu'ator Co., 4534 Wayne Ave., Philadelphia, Pa.
Fee and Stemwedel, Inc., 4949 N. Pulaski Rd., Chicago, Ill.
Foxboro Co., 106 Neponset Ave., Foxboro, Mass.
Friez & Sons, Julien P., 4 N. Central Ave., Baltimore, Md.
G. M. Mfg. Co., P. O. Box 151, Madison Square Sta., New York, N. Y.
H-B Instrument Co., 2518 N. Broad St., Philadelphia, Pa.
Hill, E. Vernon, 6826 W. Highland Ave., Chicago, Ill.
International Moistening Co., 489 S. Main St., Providence, R. I.
Johnson Service Co., 507 E. Michigan St., Milwaukee, Wis.
Johnson Tool Co., 65-67 Massasoit Ave., East Providence, R. I.
Manning, Maxwell & Moore, Inc., American Schaeffer & Budenberg Instrument Div., 11 Elias St., Bridgeport, Conn.
Moeller Instrument Co., 132nd St. & 89th Ave., Richmond Hill, N. Y.
Palmer Co., 2501 Norwood Ave., Cincinnati (Norwood), O.
Parks-Cramer Co., 970 Main St., Fitchburg, Mass.
Precision Thermometer & Instrument Co., 1434 Brandywine St., Philadelphia, Pa.
Rochester Mfg. Co., Inc., Rochester, N. Y.
Scientific Instrument Co., 531-35 W. Larned, Detroit, Mich.
Tagliabue Mfg. Co., C. J., 540 Park Ave., Brooklyn, N. Y.

Taylor Instrument Companies, 95 Ames St., Rochester, N. Y.
Trerice Co., H. O., 1420 W. Lafayette Blvd., Detroit, Mich.

HYGROSTATS

(See Controls, Humidity)

IMMERSION HEATERS

(See Heaters, Electric)

INDICATOR-CONTROLLER

Pressure (P), Relative Humidity (RH), Temperature (T)

Bristol Co., Platts Bridge, Waterbury, Conn. (RH) (T)
Brown Instrument Co., Div. Minneapolis-Honeywell Regulator Co., 4534 Wayne Ave., Philadelphia, Pa. (P) (RH) (T)
Cash Co., A. W., P. O. Box 135, Decatur, Ill. (P) (T)
Foxboro Co., 106 Neponset Ave., Foxboro, Mass. (P) (RH) (T)
Johnson Service Co., 507 E. Michigan St., Milwaukee, Wis. (RH) (T)
Leeds & Northrup Co., 4970 Stenton Ave., Philadelphia, Pa. (RH) (T)
Mason-Neilan Regulator Co., 1190 Adams St., Boston, Mass. (P) (RH) (T)
Minneapolis-Honeywell Regulator Co., 2701 Fourth Ave., South, Minneapolis, Minn.
Powers Regulator Co., 2720 Greenview Ave., Chicago, Ill. (RH) (T)
Precision Thermometer & Instrument Co., 1434 Brandywine St., Philadelphia, Pa. (RH) (T)
Pyrometer Instrument Co., 103 Lafayette St., New York, N. Y.
Tagliabue Mfg. Co., C. J., 540 Park Ave., Brooklyn, N. Y.
Taylor Instrument Companies, 95 Ames St., Rochester, N. Y. (P) (RH) (T)
Thwing-Albert Instrument Co., 3339 Lancaster Ave., Philadelphia, Pa. (T)
Wheelco Instruments Co., 1933 S. Halsted St., Chicago, Ill. (T)

INDICATOR, SMOKE

Brooke Engineering Co., Inc., 4517 Wayne Ave., Philadelphia, Pa.
Fischer-Smith, Inc., West Englewood, N. J.

INDIRECT HEATING SURFACE

(See Surface, Heating Indirect)

INDUSTRIAL AIR CONDITIONING UNITS

(See Air Conditioners, Industrial Type)

INDUSTRIAL HUMIDIFIERS

(See Humidifiers, Central Industrial Type, and Humidifiers, Room Spray, Industrial Type)

INSULATION, THERMAL

For Boilers, Pipes, Tanks, etc.

Acme Asbestos Covering & Flooring Co., 218 N. Elizabeth St., Chicago, Ill.
Alfol Insulation Co., 155 E. 45th St., New York, N. Y.
Aluminum Aircell Insulation Co., Curtis Bldg., Detroit, Mich.
American District Steam Co., Bryant St., North Tonawanda, N. Y.
American Hair & Felt Co., 1828 Merchandise Mart, Chicago, Ill.
Armstrong Cork Co., 994 Concord St., Lancaster, Pa.
Atlas Asbestos Co., Ltd., 110 McGill St., Montreal, Que., Canada.
Baldwin-Hill Co., 527 Klagg Ave., Trenton, N. J.
Barrett Co., The, 40 Rector St., New York, N. Y.
Carey Co., The, Philip, Wayne Ave., Lockland, Cincinnati, O.
Cork Import Corp., 330 W. 42nd St., New York, N. Y.
Cork Insulation Co., Inc., 155 E. 44th St., New York, N. Y.
Denver Fire Clay Co., 2301 Blake St., Denver, Colo.
Eagle-Picher Lead Co., Temple Bar Bldg., Cincinnati, O.
Ehret Magnesia Mfg. Co., Valley Forge, Pa.
General Insulating & Mfg. Co., 705 Olive St., St. Louis, Mo.
Green Fire Brick Co., A. P., 1020 Breckenridge, Mexico, Mo.
International Vermiculite Co., 11th & Standard Ave,, Springfield, Ill.
Jamar Co., Walker, 367 S. First Ave., E. Duluth, Minn.
Johns-Manville, 22 E. 40th St., New York, N. Y.
Keasbey Co., Robert A., 139-149 W. 19th St., New York, N. Y.
Keasbey & Mattison Co., Butler Ave., Ambler, Pa.
McLeod & Henry Co., Inc., Troy, N. Y.
Miller Rubber Co., Inc., 1247 S. High St., Akron, O.
Minfelt Insulation Co., The, 2288 Albion St., Toledo, O.
Mitchell & Smith, Inc., 9469 Copeland Ave., Detroit, Mich.
Mundet Cork Corp., 65 S. 11th St., Brooklyn, N. Y.
Munn & Steele, Inc., 130 Lister Ave., Newark, N. J.
Norristown Magnesia & Asbestos Co., Washington St., Norristown, Pa.
Owens-Corning Fiberglas Corp., Nicholas Bldg., Toledo, O.
Pacific States Felt & Mfg. Co., Inc., 845 Howard St., San Francisco, Cal.
Plant Rubber & Asbestos Works, 537 Brannan St., San Francisco, Cal.
Porter & Co., Inc., H. W., 825 Frelinghuysen Ave., Newark, N. J.
Refractory & Insulation Corp., 381 Fourth Ave., New York, N. Y.
Ric-wil Co., 1563 Union Commerce Bldg., Cleveland, O.
Ruberoid Co., 500 Fifth Ave., New York, N. Y.
Salt Mountain Co., 176 W. Adams St., Chicago, Ill.
Schundler & Co., Inc., F. E., 45-15 Vernon Blvd., Long Island City, N. Y.
Smith & Kanzler, Inc., 516-534 Lidgerwood Ave., Elizabeth, N. J.
Specialty Converters, Inc., East Braintree, Mass.
Standard Asbestos Mfg. Co., 820-822 W. Lake St., Chicago, Ill.
Standard Fuel Engineering Co., 667 Post Ave., South, Detroit, Mich.
Standard Lime & Stone Co., 2004 First National Bank Bldg., Baltimore, Md.
Therminsul Corp., 1603 Fulford St., Kalamazoo, Mich.
Union Asbestos & Rubber Co., 54th Ave., and 18th St., Cicero, Ill.
United Cork Companies, Central Ave., Kearney, N. J.
Universal Zonolite Insulation Co., 4110 Field Bldg., Chicago, Ill.
Wilson, Inc., Grant, 4115 W. Taylor St., Chicago, Ill.
Wyckoff & Son Co., A., 100 Home St., Elmira, N. Y.

INSULATION

For Buildings

Fill (F), Reflective (R), Board (B), Blanket (Bl)

Acme Asbestos Covering & Flooring Co., 218 N. Elizabeth St., Chicago, Ill. (F)
Air-O-Cel Industries, Inc., 11616 Cloverdale Ave., Detroit, Mich. (F) (R) (B) (Bl)
Alfol Insulation Co., Inc., 155 E. 44th St., New York, N. Y. (Aluminum foil) (R)
Alton Mineral Wool Insulation Co., P. O. Box 268, Alton, Ill. (F)
Aluminum Aircell Insulation Co., Curtis Bldg., Detroit, Mich. (R)
American District Steam Co., Bryant St., No. Tonawanda, N. Y. (F)
American Flange & Mfg. Co., Inc., Ferro-Therm Insulation Div., 30 Rockefeller Plaza, New York, N. Y. (B)
American Hair & Felt Co., 1828 Merchandise Mart, Chicago, Ill. (Bl)
Armstrong Cork Co., 994 Concord St., Lancaster, Pa. (B)
Bache & Co., Semon, Greenwich & Morton Sts., New York, N. Y. (F)
Baldwin-Hill Co., 527 Klagg Ave., Trenton, N. J. (F)
Barber Asphalt Corp., Barber, N. J.
Barrett Co., The, 40 Rector St., New York, N. Y. (F) (Bl)
Cabot, Inc., Samuel, 141 Milk St., Boston, Mass. (B) (Bl)
Carey Co., Philip, The, Wayne Ave., Lockland, Cincinnati, O. (F) (B)
Celotex Corp., The, 919 N. Michigan Ave., Chicago, Ill. (B)
Chamberlin Metal Weather Strip Co., 1254 La Brosse St., Detroit, Mich. (F)
Certain-teed Products Corp., 100 E. 42nd St., New York, N. Y. (B) (R)
Cork Import Corp., 330 W. 42nd St., New York, N. Y. (B)
Cork Insulation Co., Inc., 155 E. 44th St., New York, N. Y. (B) (F)
Cornell Wood Products Co., 230 N. Michigan Ave., Chicago, Ill. (B)
Crown Cork & Seal Co., 4401 Eastern Ave., Baltimore, Md. (B) (F)
Doheny Co., John J., 326 Lake St., Belmont, Mass. (Bl)
Eagle-Picher Lead Co., Temple Bar Bldg., Cincinnati, O. (F) (Bl)
Fir-Tex Insulating Board Co., St. Helens, Ore. (B)
Flintkote Co., 50 W. 50th St., New York, N. Y. (B) (F)
General Insulating & Mfg. Co., 705 Olive St., St. Louis, Mo. (F) (Bl)
General Insulating Products Co., 8821 15th Ave., Brooklyn, N. Y. (F)
Hinde & Dauch Paper Co., Sandusky, O.
Insulite Co., 1100 Builders Exchange Bldg., Minneapolis, Minn. (B)
Insul-Wool Insulation Corp., Wichita, Kan.
International Vermiculite Co., 11th & Stanford Ave., Springfield, Ill. (F)
Johns-Manville, 22 E. 40th St., New York, N. Y. (F) (B)
Johnston Tin Foil & Metal Co., 6100 S. Broadway, St. Louis, Mo. (R)
Keasbey Co., Robert A., 139-149 W. 19th St., New York, N. Y. (F)
Keasbey & Mattison Co., Butler Ave., Ambler, Pa. (F)
Kimberly-Clark Corp., Neenah, Wis. (F)
Krehbiel, J. H., 425 N. Crawford Ave., Chicago, Ill.
Marblehead Lime Co., 160 N. La Salle St., Chicago, Ill. (F)
Masonite Corp., Cellufoam Products Div., 6565 S. Lavergne Ave., Chicago, Ill. (F)
Masonite Corp., 111 W. Washington St., Chicago, Ill. (B)
Mineral Insulation Co., 103rd & Southwest Highway, Chicago Ridge, Ill. (F) (Bl)
Minfelt Insulation Co., The, 2288 Albion St., Toledo, O. (B)
Mitchel & Smith, Inc., 9469 Copeland Ave., Detroit, Mich. (B) (F)
Mundet Cork Corp., 65 S. 11th St., Brooklyn, N. Y. (B) (F)
National Gypsum Co., Delaware Ave., Buffalo, N. Y. (B) (F)
Pacific Lumber Co., The, 100 Bush St., San Francisco, Cal.
Pacific States Felt & Mfg. Co., Inc., 845 Howard St., San Francisco, Cal.
Plastergon Wall Board Co., Philadelphia Ave., Buffalo, N. Y. (B)
Refractory Insulation Corp., 381 Fourth Ave., New York, N. Y. (F)
Rock Products Co., 917 Berryhill St., Nashville, Tenn. (F) (Bl)
Rock Wool Products Co., P. O. Box 276, Wabash, Ind. (F)
Ruberoid Co., 500 Fifth Ave., New York, N. Y. (F) (R) (Bl)
Specialty Converters, Inc., East Braintree, Mass. (R)
Sprayo-Flake Co., 2715 Irving Park Blvd., Chicago, Ill. (F)
Standard Asbestos Mfg. Co., 820-822 W. Lake St., Chicago, Ill. (F)
Standard Lime & Stone Co., 2004 First National Bank Bldg., Baltimore, Md. (F)
Therminsul Corp., 1603 Fulford St., Kalamazoo, Mich. (F)
Truscon Steel Co., 1315 Albert St., Youngstown, O. (B) (R)
United Cork Companies, Lyndhurst, N. J. (B) (F)
United States Gypsum Co., 300 W. Adams St., Chicago, Ill. (F) (B)
United States Mineral Wool Co., 9 S. Clinton St., Chicago, Ill. (F)
Universal Gypsum & Lime Co., 105 W. Madison St., Chicago, Ill. (F)
Universal Zonolite Insulation Co., 4110 Field Bldg., Chicago, Ill. (F)
Upson Co., The, Upson Point, Lockport, N. Y. (B)
Wilson & Co., 4100 S. Ashland Ave., Chicago, Ill. (B) (Bl)
Wilson, Inc., Grant, 4115 W. Taylor St., Chicago, Ill. (F) (Bl)
Wood Conversion Co., 1981 First National Bank Bldg., St. Paul, Minn. (B) (Bl)

INSULATION

For Duct Application

Acme Asbestos Covering & Flooring Co., 218 N. Elizabeth St., Chicago, Ill.
Air-O-Cel Industries, Inc., 11616 Cloverdale Ave., Detroit, Mich.
Alfol Insulation Co., Inc., 155 E. 44th St., New York, N. Y.
American Flange & Mfg. Co., Inc., Ferro-Therm Insulation Div., 30 Rockefeller Plaza, New York, N. Y.
American Hair & Felt Co., 1828 Merchandise Mart, Chicago, Ill.
Armstrong Cork Co., 994 Concord St., Lancaster, Pa.
Atlas Asbestos Co., Ltd., 110 McGill St., Montreal, Que., Canada.
Barrett Co., The, 40 Rector St., New York, N. Y.
Berry, Jr., & Co., Inc., F. E. Everett, Mass.
Cabot, Inc., Samuel, 141 Milk St., Boston, Mass.
Carey Co., The, Philip, Wayne Ave., Lockland, Cincinnati, O.
Celotex Corp., The, 919 N. Michigan Ave., Chicago, Ill.
Cork Import Corp., 330 W. 42nd St., New York, N. Y.
Cork Insulation Co., Inc., 155 E. 44th St., New York, N. Y.
Crown Cork & Seal Co., 4401 Eastern Ave., Baltimore, Md.
Eagle-Picher Lead Co., Temple Bar Bldg., Cincinnati, O.
Ehret Magnesia Mfg. Co., Valley Forge, Pa.
Felters Co., Inc., 210 South St., Boston, Mass.
Fir-Tex Insulating Board Co., St. Helens, Ore.
General Insulating & Mfg. Co., 705 Olive St., St. Louis, Mo.
General Insulating Products Co., 8821 15th Ave., Brooklyn, N. Y.
Insulite Co., 1100 Builders Exchange Bldg., Minneapolis, Minn.
International Vermiculite Co., 11th & Stanford Ave., Springfield, Ill.
Johns-Manville, 22 E. 40th St., New York, N. Y.
Keasbey Co., Robert A., 139-149 W. 19th St., New York, N. Y.
Keasbey & Mattison Co., Butler Ave., Ambler, Pa.
Masonite Corp., 111 W. Washington St., Chicago, Ill.
Masonite Corp., Cellufoam Products Div., 6565 S. Lavergne Ave., Chicago, Ill.
Mineral Insulation Co., 103rd & Southwest Highway, Chicago Ridge, Ill.
Minfelt Insulation Co., The, 2288 Albion St., Toledo, O.
Mitchel & Smith, Inc., 9469 Copeland Ave., Detroit, Mich.
Mundet Cork Corp., 65 S. 11th St., Brooklyn, N. Y.
Nelson Mfg. Co., B. F., Corner Main & Marshall Sts., N. E., Minneapolis, Minn.
Norristown Magnesia & Asbestos Co., Washington St., Norristown, Pa.
Owens-Corning Fiberglas Corp., Nicholas Bldg., Toledo, O.
Pacific States Felt & Mfg. Co., Inc., 845 Howard St., San Francisco, Cal.

Plant Rubber & Asbestos Works, 537 Brannan St., San Francisco, Cal.
Presstite Engineering Co., 3900 Chouteau St., St. Louis, Mo.
Refractory & Insulation Corp., 381 Fourth Ave., New York, N. Y.
Rock Wool Products Co., P. O. Box 276, Wabash, Ind.
Ruberoid Co., 500 Fifth Ave., New York, N. Y.
Sall Mountain Co., 176 W. Adams St., Chicago, Ill.
Schundler & Co., Inc., F. E., 45-15 Vernon Blvd., Long Island City, N. Y.
Smith & Kanzler, Inc., 516-534 Lidgerwood Ave., Elizabeth, N. J.
Specialty Converters, Inc., East Braintree, Mass.
Sprayo-Flake Co., 2715 Irving Park Blvd., Chicago, Ill.
Standard Asbestos Mfg. Co., 820-822 W. Lake St., Chicago, Ill.
Therminsul Corp., 1603 Fulford St., Kalamazoo, Mich.
Thompson & Co., Box 6757, Pittsburgh, Pa.
United Cork Companies, Lyndhurst, N. J.
Universal Zonolite Insulation Co., 4110 Field Bldg., Chicago, Ill.
Western Felt Wks., 4029-4117 Ogden Ave., Chicago, Ill.
Western Silicair Products, Inc., 72 S. Alameda Ave., Burbank, Cal.
Wilson & Co., 4100 S. Ashland Ave., Chicago, Ill.
Wilson, Inc., Grant, 4115 W. Taylor St., Chicago, Ill.

INSULATION, SOUND

Air-O-Cel Industries, Inc., 11616 Cloverdale Ave., Detroit, Mich.
American Hair & Felt Co., 1828 Merchandise Mart, Chicago, Ill.
Armstrong Cork Co., 994 Concord St., Lancaster, Pa.
Atlas Asbestos Co., Ltd., 110 McGill St., Montreal, Que., Canada.
Barrett Co., The, 40 Rector St., New York, N. Y.
Berry, Jr. & Co., Inc., F. E., Everett, Mass.
Burgess Battery Co., 500 W. Huron St., Chicago, Ill.
Cabot, Inc., Samuel, 141 Milk St., Boston, Mass.
Carey Co., The, Philip, Wayne Ave., Lockland, Cincinnati, O.
Celotex Corp., The, 919 N. Michigan Ave., Chicago, Ill.
Doheny Co., John J., 326 Lake St., Belmont, Mass.
Felters Co., Inc., 210 South St., Boston, Mass.
General Insulating & Mfg. Co., 705 Olive St., St. Louis, Mo.
Insulite Co., 1100 Builders Exchange Bldg., Minneapolis, Minn.
Insul-Wool Insulation Corp., Wichita, Kan.
Johns-Manville, 22 E. 40th St., New York, N. Y.
Keasbey & Mattison Co., Butler Ave., Ambler, Pa.
Masonite Corp., 111 W. Washington St., Chicago, Ill.
Masonite Corp., Cellufoam Products Div., 6565 S. Lavergne Ave., Chicago, Ill.
Maxim Silencer Co., 410 Asylum St., Hartford, Conn.
Minfelt Insulation Co., The, 2288 Albion St., Toledo, O.
Mitchell & Smith, Inc., 9469 Copeland Ave., Detroit, Mich.
Mortell Co., J. W., 310 S. Michigan Ave., Detroit, Mich.
Mundet Cork Corp., 65 S. 11th St., Brooklyn, N. Y.
Munn & Steele, Inc., 130 Lister Ave., Newark, N. J.
Nelson Mfg. Co., B. F., Corner Main & Marshall Sts., N. E., Minneapois, Minn.
Owens-Corning Fiberglas Corp., Nicholas Bldg., Toledo, O.
Pacific States Felt & Mfg. Co., Inc., 845 Howard St., San Francisco, Cal.
Plant Rubber & Asbestos Works, 537 Brannan St., San Francisco, Cal.
Spray-Flake Co., 2715 Irving Park Blvd., Chicago, Ill.
Therminsul Corp., 1603 Fulford St., Kalamazoo, Mich.
Thompson & Co., Box 6757, Pittsburgh, Pa.
United States Mineral Wool Co., 9 S. Clinton St., Chicago, Ill.
Universal Zonolite Insulation Co., 4110 Field Bldg., Chicago, Ill.
Upson Co., The, Upson Point, Lockport, N. Y.
Western Felt Works, 4029-4117 Ogden Ave., Chicago, Ill.
Western Silicair Products, Inc., 72 S. Alameda Ave., Burbank, Cal.
Wilson, Inc., Grant, 4115 W. Taylor St., Chicago, Ill.
Wood Conversion Co., 1981 First National Bank Bldg., St. Paul, Minn.

IONIZING EQUIPMENT

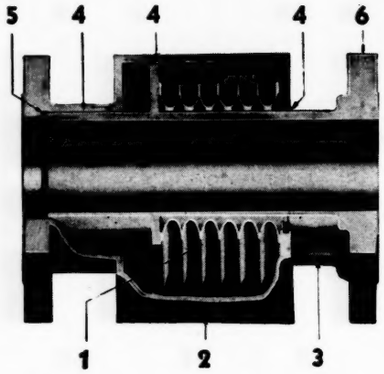
American Hydrozone Co., Inc., 10 E. 40th St., New York, N. Y.
Corozone Air Conditioning Corp., 1422 Euclid Ave., Cleveland, O.
Electroaire Corp., 1455-57 W. Congress St., Chicago, Ill.
Lowell Air Conditioning Corp., Otis Bldg., Philadelphia, Pa.
Montgomery Bros., 61 Fremont St., San Francisco, Cal.
Norwood Filtration Co., The, N. Maple St., Florence, Mass.
Ozo-Ray Process Corp., 400 N. Sangamon St., Chicago, Ill.
United States Ozone Co. of America. Crescent St., Scottdale, Pa.

JOINTS, PIPE, EXPANSION

Packless (P), Slip (S)

American District Steam Co., Bryant St., North Tonawanda, N. Y. (P) (S)
Atlas Asbestos Co., Ltd., 110 McGill St., Montreal, Que., Canada.
Badger Fire Extinguisher Co., 31 St. James Ave., Boston, Mass. (P)
Badger & Sons Co., E. B., 75 Pitts St., Boston, Mass. (Corrugated copper, stainless steel) (P)
Barco Mfg. Co., 1801 Winnemac Ave., Chicago, Ill. (P)
Belfield Co., H., 435 N. Broad St., Philadelphia, Pa. (P)
Central Station Steam Co., 2910 E. Woodbridge St., Detroit, Mich. (P) (S)
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Croll-Reynolds Engineering Co, Inc., 17 John St., New York, N. Y. (P)
Dahlquist Mfg. Co., Inc., 40 W. 3rd St., Boston, Mass. (P)
Dresser Mfg. Co., 490 Fisher Ave., Bradford, Pa. (S)
Duriron Co., Inc., 450 N. Findlay St., Dayton, O. (Acid resisting) (S)
Foster Wheeler Corp., 165 Broadway, New York, N. Y. (P)
Fulton Sylphon Co., Knoxville, Tenn. (P) (S)
Griscom-Russell Co., The, 285 Madison Ave., New York, N. Y. (P)
Harris & Co., Arthur, 210 N. Aberdeen St., Chicago, Ill. (P)
Hasco Valve & Machine Co., 1819 W. St. Paul Ave., Milwaukee, Wis. (S)
Howard Iron Works & Alberger Heater Co., 287 Chicago St., Buffalo, N. Y. (S)
Illinois Engineering Co., 2035 S. Racine Ave., Chicago, Ill. (S)
Jarecki Mfg. Co., 1345 W. 12th St., Erie, Pa. (S)
Kopperman & Sons, Joseph, 316 New St., Philadelphia, Pa. (P)
Northern Indiana Brass Co., 935 Plum St., Elkhart, Ind. (P) (S)
Pittsburgh Valve & Fittings Corp., Barberton, O. (S)
Ross Heater & Mfg. Co., Inc., 1407 West Ave., Buffalo, N. Y. (S)
Straight Line Foundry & Machine Corp., Direct Separator Div., 218 S. Geddes St., Syracuse, N. Y. (S)
Taylor Forge & Pipe Wks., P. O. Box 485, Chicago, Ill. (P) (S)
United States Rubber Co., 1790 Broadway, New York, N. Y. (P)

ADSCO PACKLESS, U-RING EXPANSION JOINT
COMPACT AND SIMPLIFIED DESIGN WITH FLEXIBLE STEEL ELEMENT
FOR HIGH PRESSURE, HIGH TEMPERATURE SERVICE



(1) *Expansion Element of corrosion resistant steel* (2) *Steel Body* (3) *Movable Sleeve* (4) *Three-point guiding for Sleeve* (5) *Limit Stop* (6) *Flanged or beveled ends for welding.*

Corrosion Resistant Steel Expansion Element

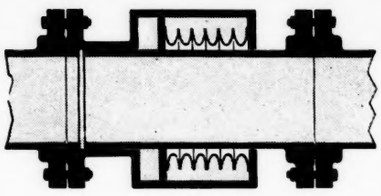
Under least strain when in service

The only packless expansion joint where the expansion element is under compression when in operation and under minimum flexing strain when in service.

The expansion element is a series of corrosion resistant steel U-Rings welded to the steel body and to the guide on the sleeve, forming a permanent seal between the stationary body and the movable sleeve. The steel body is similar in quality and thickness to the pipe itself. A full, unrestricted opening is provided through the joint by the movable sleeve.

Especially suitable for installation in underground or surface pipe lines in inaccessible locations — requires no maintenance. Available with flanged or beveled ends, with or without anchor base for pressures to 300 lbs.

Write for new Bulletin No. 35-50-Y.



How it Operates

Diagrammatic sketch above illustrates the principle of operation. The dotted area represents the steam space through the joint and around the outside of the element. The inside of the element is under atmospheric pressure and the line pressure is on the outside of the element. No dirt or scale can enter the element to interfere with its operation.

AMERICAN DISTRICT STEAM COMPANY
NORTH TONAWANDA, N.Y.
IN BUSINESS OVER SIXTY YEARS

Walworth Co., 60 E. 42nd St., New York, N. Y. (P) (S)
Webster & Co., Warren, 17th & Federal Sts., Camden, N. J. (S)
Yarnall-Waring Co., Chestnut Hill, Philadelphia, Pa. (S)

KATA THERMOMETERS
(See Thermometers, Kata)

LAMPS, STERILIZING
For Duct Application
General Electric Co., Lamp Dept., 1 River Rd., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co., Bloomfield, N. J.

LEATHER BELTS
(See Belting, Flat)

LINED PIPE
(See Pipe, Lined)

LININGS, FLUE
(See Flue Linings)

LIQUID LEVEL GAGES
(See Gages, Liquid Level)

LOUVERS
Accurate Mfg. Works, 2336-38 Milwaukee Ave., Chicago, Ill.
Acme Tin Plate Roofing Supply Co., 3rd & Westmoreland Sts., Philadelphia, Pa.
Air Controls, Inc., 9205 Detroit Ave., Cleveland, O.
Airmaster Corp., 4317 Ravenswood Ave., Chicago, Ill.
Allen Co., E. H., 22 Dorrance St., Boston, Mass.
Allen Corp., 9767 Erwin Ave., Detroit, Mich.
American Blower Corp., 6000 Russell St., Detroit, Mich.
American Coolair Corp., 3604 Mayflower St., Jacksonville, Fla.
American Foundry & Furnace Co., Washington St. at McClun, Bloomington, Ill.
American Warming & Ventilating Co., 1017-1021 Summit St., Toledo, O.
Ames Co., W. R., 150 Hooper St., San Francisco, Cal.
Arex Co., 333 N. Michigan Ave., Chicago, Ill.
Autovent Fan & Blower Co., 1811-27 N. Kostner Ave., Chicago, Ill.
Barber-Colman Co., 225 Loomis St., Rockford, Ill.
Belanger Fan & Blower Co., 1230 18th St., Detroit, Mich.
Bishop & Babcock Mfg. Co., 4901 Hamilton Ave., Cleveland, O.
Buffalo Forge Co., 171 Mortimer St., Buffalo, N. Y.
Burt Mfg. Co., 635 Main St., Akron. O.
Campbell Heating Co., E. K., 2445 Charlotte St., Kansas City, Mo.
Champion Blower & Forge Co., Harrisburg Ave., and Charlotte St., Lancaster, Pa.
Chelsea Fan & Blower Co., 370 W. 15th St., New York, N. Y.
Chicago Metal Mfg. Co., 3724 S. Rockwell St., Chicago, Ill.
Circulators & Devices Mfg. Corp., 100 Prince St., New York, N. Y.
Clay Equipment Corp., Cedar Falls, Ia.
Economy Electric Mfg. Co., 4606 W. 21st Pl., Chicago, Ill.
Electrovent Fan & Mfg. Co., 812 W. Lake St., Chicago, Ill.
Elgo Shutter & Mfg. Co., 634 W. Warren Ave., Detroit, Mich.
Falstrom Co., Main Ave., & D. L. & W. R. R., Passaic, N. J.
Fingles Co., The, Reistertown Rd., at Elgin Ave., Baltimore, Md.
General Blower Co., Inc., 2402 Market St., Philadelphia, Pa.
General Regulator Corp., 2608 Arthington St., Chicago, Ill.
Gillian Mfg. Co., 7752 Dubois St., Detroit, Mich.
Hendrick Mfg. Co., 37 Dundaff St., Carbondale, Pa.
Hirschman Co., W. F., 1245 McKinley Parkway, Buffalo, N. Y.
International Engineering Inc. 1145 Bolander Ave., Dayton, O.
Johnson Fan & Blower Corp., 1320 W. Lake St., Chicago, Ill.
Jordan & Co., Paul R., 631 S. Delaware St., Indianapolis, Ind.
King Ventilating Co., Box 178, Owatonna, Minn.
Kirk & Blum Mfg. Co., 2838-52 Spring Grove Ave., Cincinnati, O.
Kisco Co., Inc., 39th and Chouteau Ave., St. Louis, Mo.
Lohman, Inc., Wm. J., 62 Ninth Ave., New York, N. Y.
Martin Metal Mfg. Co., 900 E. Second St., Wichita, Kan.
Meier Electric & Machine Co., 3525 E. Washington St., Minneapolis, Ind.
Meyer Mfg. Co., 4823 Wabash Ave., Detroit, Mich.
Milcor Steel Co., S. 41st & Burnham Sts., Milwaukee, Wis.
Minneapolis - Honeywell Regulator Co., 2701 Fourth Ave., South, Minneapolis, Minn.
Mountain States Equipment Co., 1238 Speer Blvd., Denver, Colo.
Myers Electric Co., 410 Third Ave., Pittsburgh, Pa.
Norman Sheet Metal Mfg. Co., 212-236 N. Cedar St., Nevada, Mo.
Palmer Mfg. Corp., Phoenix, Ariz.
Peerless Electric Co., 3021 W. Market St., Warren, O.
Robertson Co., H. H., 2000 Grant Bldg., Pittsburgh, Pa.
Schoedinger, F. O., 322-358 Mt. Vernon Ave., Columbus, O.
Signal Electric Mfg. Co., Menominee, Mich.
Sturtevant Co., B. F., Damon St., Hyde Park, Boston, Mass.
Supreme Heater & Ventilating Corp., 1911 N. Market St., St. Louis, Mo.
Tuttle & Bailey, Inc., Corbin Ave., New Britain, Conn.
United States Register Co., Burnham St., Battle Creek, Mich.
Utility Fan Corp., 2528 Santa Fe Ave., Los Angeles, Cal.
Van Noorden Co., E., 100 Magazine St., Boston, Mass.
Waterloo Register Co., 600 Anita St., Waterloo, Ia.
Willis Mfg. Co., Inc., 156 N. Academy St., Galesburg, Ill.

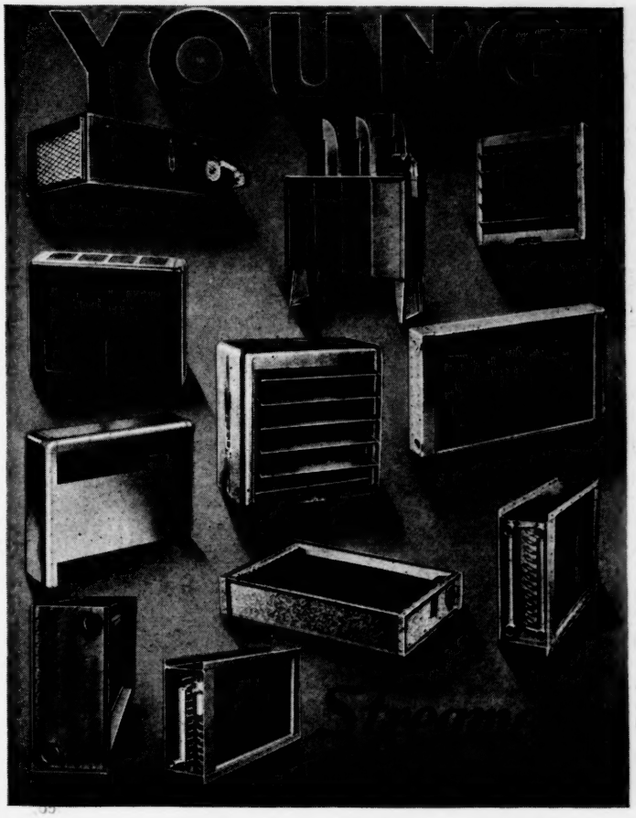
LOW WATER ALARMS
(See Boiler Alarms)

LOW WATER CUT-OFFS
(See Boiler Cut-Offs)

MACHINES, ABSORPTION
For Refrigeration
Audiffren Refrigerating Sales Co., 9 Codding St., Providence, R. I.
Carbondale Div., Worthington Pump & Machinery Corp., Harrison, N. J.
Philadelphia & Reading Coal & Iron Co., N. E. Cor. 12th & Market Sts., Philadelphia, Pa.
Rafter Machine Co., 259 Stephens St., Belleville, N. J.
Vogt Machine Co., Henry, 10th & Ormsby Sts., Louisville, Ky.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
Williams Oil-O-Matic Heating Corp., 1201 East Bell, Bloomington, Ill.
York Ice Machinery Corp., Roosevelt Ave., York, Pa.

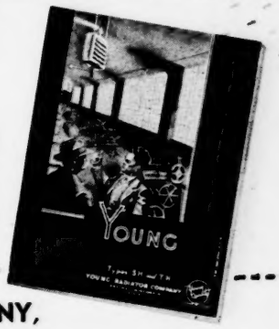
MALLEABLE FITTINGS
(See Fittings, Pipe, Malleable)

MANIFOLDS
For Refrigeration
Baker Ice Machine Co., Inc., 1508 Evans St., Omaha, Neb.
Henry Valve Co., 1019 N. Spaulding Ave., Chicago, Ill.
Imperial Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.
Kerotest Mfg. Co., 2525 Liberty Ave., Pittsburgh, Pa.
Roessing Mfg. Co., 1616 Noble St., Sharpsburg Sta., Pittsburgh, Pa.
Superior Valve and Fittings Co., 1509 W. Liberty Ave., Pittsburgh, Pa.
York Ice Machinery Corp., Roosevelt Ave., York, Pa.



Whatever your heating or cooling problems, you will find a practical, economical solution in selecting a YOUNG product. Satisfactory past performance prompts many architects, heating contractors and engineers to specify YOUNG units for they know that YOUNG design incorporates every modern phase of heat transfer, and that the units are light in weight, easy to handle and install, compact and attractive in appearance.

The YOUNG representative in your territory is a competent heating engineer thoroughly versed in the science of heat transfer. He has a knowledge of local conditions and will aid you without cost or obligation.



FILL OUT THE COUPON

Catalogs are available on all products illustrated, giving full description, capacities, working tables and installation drawings.

YOUNG RADIATOR COMPANY,
719 S. Marquette St., Racine, Wis.

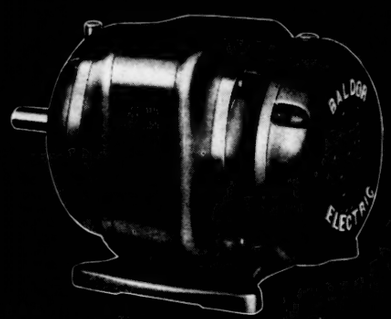
Gentlemen: I desire the following catalogs:

☐ 4039 STREAMAIRE Convectors
☐ 2738 SH Unit Heaters
☐ 336 FH Unit Heaters
☐ 2540 Vertiflow Unit Heaters
☐ 5039 Young Evaporators
☐ 6539 FC Heating Units
☐ 5537 Cooling Coils
☐ 4540 Heat Transfer Surfaces
☐ 7040 Ductless Air Conditioning Unit

Name.....
Firm.....
Street.....
City.....State.....

THIS BALDOR

YEAR-AHEAD MOTOR



will add

EXTRA SALES FEATURES

to your 1941 product at no extra cost . . . .

STREAMCOOLED. Provides a ball bearing totally enclosed protected motor with a non-clogging cooling system.

GLASS INSULATED. Permits more horse power in the same space and longer life under abusive service.

NO EXTRA COST. Baldor streamcooled motors, in either standard insulation or glass insulation at ordinary open motor prices.

Many other features explained in BALDOR Bulletin No. 202. Ask for it.

BALDOR ELECTRIC COMPANY, ST. LOUIS
Representatives in Principal Cities

BALDOR
BETTER MOTORS

MANOMETERS

Bacharach Industrial Instrument Co., 7000 Bennett St., Pittsburgh, Pa.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., 4534 Wayne Ave., Philadelphia, Pa.
Builders Iron Foundry, 9 Codding St., Providence, R. I.
Defender Automatic Regulator Co., 308 S. 8th St., St. Louis, Mo.
Detroit Air Meter Co., Box 1473, Detroit, Mich.
Friez & Sons, Julien P., 4 N. Central Ave., Baltimore, Md.
Hill, E. Vernon, 2826 W. Highland Ave., Chicago, Ill.
Huyette Co., Inc., Paul B., 401 N. Broad St., Philadelphia, Pa.
Meriam Co., The, 1955 W. 112th St., Cleveland, O.
Morey & Jones, Ltd., 922 S. Hemlock St., Los Angeles, Cal.
Precision Thermometer & Instrument Co., 1434 Brandywine St., Philadelphia, Pa.
Republic Flow Meters Co., 2240 Diversey Pkwy., Chicago, Ill.
Scientific Instrument Co., 531-35 W. Larned St., Detroit, Mich.
Tagliabue Mfg. Co., C. J., 540 Park Ave., Brooklyn, N. Y.
Taylor Instrument Companies, 95 Ames St., Rochester, N. Y.
Trerice Co., H. O., 1420 W. Lafayette Blvd., Detroit, Mich.

MASONRY DRILLS

Carboloy Co., Inc., 1107 E. 8 Mile Blvd., Detroit, Mich.

MERCURY SWITCHES

(See Switches, Mercury)

METERS

Air Velocity

American Meter Co., Inc., 60 E. 42nd St., New York, N. Y.
Bacharach Industrial Instrument Co., 7000 Bennett St., Pittsburgh, Pa.
Detroit Air Meter Co., Box 1473, Detroit, Mich.
Friez & Sons, Julien P., 4 N. Central Ave., Baltimore, Md.
Illinois Testing Laboratories, Inc., 419 N. La Salle St., Chicago, Ill.
Taylor Instrument Companies, 95 Ames St., Rochester, N. Y.

METERS

Condensation

American District Steam Co., Bryant St., North Tonawanda, N. Y.
Buffalo Meter Co., 2917 Main St., Buffalo, N. Y.
Central Station Steam Co., 2910 E. Woodbridge St., Detroit, Mich.
Morehead Mfg. Co., 4895 Grand River Ave., Detroit, Mich.
Tagliabue Mfg. Co., C. J., 540 Park Ave., Brooklyn, N. Y.
Worthington-Gamon Meter Co., Harrison, N. J.

METERS

Refrigerant Flow

Builders Iron Foundry, 9 Codding St., Providence, R. I.
Schutte & Koerting Co., 12th & Thompson Sts., Philadelphia, Pa.

METERS

Steam Flow

American District Steam Co., Bryant St., North Tonawanda, N. Y.
American Meter Co., 60 E. 42nd St., New York, N. Y.
Bailey Meter Co., 1050 Ivanhoe Rd., Cleveland, O.
Bristol Co., Platts Bridge, Waterbury, Conn.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., 4534 Wayne Ave., Philadelphia, Pa.
Builders Iron Foundry, 9 Codding St., Providence, R. I.
Cochrane Corp., 3161 N. 17th St., Philadelphia, Pa.
Foxboro Co., 106 Neponset Ave., Foxboro, Mass.
Huyette Co., Inc., Paul B., 401 N. Broad St., Philadelphia, Pa.
Leeds & Northrup Co., 4970 Stenton Ave., Philadelphia, Pa.
Mason-Neilan Regulator Co., 1190 Adams St., Boston, Mass.
Meriam Co., The, 1955 W. 112th St., Cleveland, O.
Minneapolis-Honeywell Regulator Co., 2701 Fourth Ave., South, Minneapolis, Minn.
Morey & Jones, Ltd., 922 S. Hemlock St., Los Angeles, Cal.
Republic Flow Meters Co., 2240 Diversey Pkwy., Chicago, Ill.
Tagliabue Mfg. Co., C. J., 540 Park Ave., Brooklyn, N. Y.
Taylor Instrument Companies, 95 Ames St., Rochester, N. Y.

MIXING VALVES

(See Valves, Steam and Water, Mixing)

MOTORS

Damper-Operating

Au-Temp-Co Corp., 1 Park Ave., New York, N. Y.
Automatic Products Co., 2450 N. 32nd St., Milwaukee, Wis.
Automatic Temperature Control Co., Inc., 22 E. Logan St., Philadelphia, Pa.
Barber-Colman Co., 225 Loomis St., Rockford, Ill.
Brooke Engineering Co., Inc., 4517 Wayne Ave., Philadelphia, Pa.
Cooper Co., Clark, 159 Jefferson St., Philadelphia, Pa.
Detroit Lubricator Co., 5900 Trumbull Ave., Detroit, Mich.
Friez & Sons, Julien P., 4 N. Central Ave., Baltimore, Md.
Fulton Sylphon Co., Knoxville, Tenn.
General Controls Co., 700 W. Ivy St., Glendale, Cal.
Gleason-Avery, Inc., 27 Clark St., Auburn, N. Y. (F)
Johnson Service Co., 507 E. Michigan St., Milwaukee, Wis.
Minneapolis-Honeywell Regulator Co., 2701 Fourth Ave., South, Minneapolis, Minn.
Perfex Corp. (Controls Div.), 500 W. Oklahoma Ave., Milwaukee, Wis.
Powers Regulator Co., 2720 Greenview Ave., Chicago, Ill.
Russell Electric Co., 348 W. Huron St., Chicago, Ill.
Tagliabue Mfg. Co., C. J., 540 Park Ave., Brooklyn, N. Y.
Taylor Instrument Companies, 95 Ames St., Rochester, N. Y.
Vapor Car Heating Co., Inc., 80 E. Jackson Blvd., Chicago, Ill.
White-Rodgers Electric Co., 1289 Cass Ave., St. Louis, Mo.
Young Regulator Co., 4500 Euclid Ave., Cleveland, O.

MOTORS

Electric

Less than 1 Hp (F), 1 Hp and over (M)

Air-O-Line Co., The, 1101-1107 McKinney, Dallas, Tex.
Allis Co., Louis, The, 427 E. Stewart St., Milwaukee, Wis. (M)
Allis-Chalmers Mfg. Co., 1126 S. 70th St., Milwaukee, Wis. (M)
Baldor Electric Co., 4353 Duncan Ave., St. Louis, Mo. (F) (M)
Barber-Colman Co., 225 Loomis St., Rockford, Ill. (F)
Black & Decker Mfg. Co., Pennsylvania Ave., Towson, Md. (F)
Bodine Electric Co., 2254 W. Ohio St., Chicago, Ill. (F)
Brown-Brockmeyer Co., 1098 Smithville Rd., Dayton, O. (F) (M)
Burke Electric Co., 1201 W. 12th St., Erie, Pa. (M)
Canatsey Electric Mfg. Co., 620 Wyandotte St., Kansas City, Mo. (F) (M)
Century Electric Co., 1806 Pine St., St. Louis, Mo. (F) (M)
Continental Electric Co., Inc., 323 Ferry St., Newark, N. J. (M)
Crocker-Wheeler Elec. Mfg. Co., Ampere, N. J. (M)
Delco Appliance Div., General Motors Sales Corp., Rochester, N. Y. (F)
Delco Products Corp., 329 E. First St., Dayton, O. (F) (M)
Diehl Mfg. Co., Trumbull St., Elizabethport, N. J. (F) (M)

Duro Co., 537-40 E. Monument Ave., Dayton, O. (M)
Electric Machinery Mfg. Co., 1331 Tyler St., N. E., Minneapolis, Minn. (M)
Emerson Electric Mfg. Co., 1847 Washington Ave., St. Louis, Mo. (F) (M)
Fairbanks, Morse & Co., 600 Michigan Ave., Chicago, Ill. (F) (M)
General Electric Co., 1 River Rd., Schenectady, N. Y. (F) (M)
Holtzer-Cabot Electric Co., 125 Amory St., Boston, Mass. (F) (M)
Howell Electric Motors Co., Howell, Mich. (F) (M)
Ideal Electric & Mfg. Co., E. First & Oak Sts., Mansfield, O. (M)
Imperial Electric Co., 64 Ira Ave., Akron, O. (M)
Janette Mfg. Co., 556 W. Monroe St., Chicago, Ill. (F) (M)
Leland Electric Co., 1501 Webster St., Dayton, O. (F) (M)
Lincoln Electric Co., 12818 Coit Rd., Cleveland, O. (F) (M)
Marathon Electric Mfg. Corp., 131 W. Washington St., Wausau, Wis. (F) (M)
Marble-Card Electric Co., Superior Ave., Gladstone, Mich. (M)
Master Electric Co., 100 Davis Ave., Dayton, O. (F) (M)
Ohio Electric Mfg. Co., 5906 Maurice Ave., Cleveland, O. (F)
Peerless Electric Co., 3021 W. Market St., Warren, O. (F) (M)
Philadelphia Gear Co., Erie Ave., & G St., Philadelphia, Pa. (Geared) (M)
Reliance Electric & Engineering Co., Ivanhoe Rd., Cleveland, O. (M)
Reynolds Electric Co., 2650 W. Congress, Chicago, Ill. (F)
Robbins & Myers, Inc., Lagonda Ave., Springfield, O. (F) (M)
Speedway Mfg. Co., 1834 S. 52nd Ave., Chicago, (Cicero), Ill. (F)
Star Electric Motor Co., 197 Grove St., Bloomfield, N. J. (M)
Sterling Electric Motors, Inc., 5401 Telegraph Rd., Los Angeles, Cal. (F) (M)
U. S. Electrical Motors, Inc., 200 E. Slauson Ave., Los Angeles, Cal. (F) (M)
Victor Electric Products, Inc., 737 Reading Rd., Cincinnati, O. (F)
Wagner Electric Corp., 6400 Plymouth Ave., St. Louis, Mo. (F) (M)
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. (F) (M)
Zobell Electric Motor Corp., 96 South Ave., Garwood, N. J. (M)

MOTOR STARTERS

(See Controllers—Starters)

MOTORS

Valve-Operating

Au-Temp-Co Corp., 1 Park Ave., New York, N. Y.
Automatic Temperature Control Co., Inc., 22 E. Logan St., Philadelphia, Pa.
Barber-Colman Co., 225 Loomis St., Rockford, Ill.
Barnes Co., W. F. & John, Rockford, Ill.
Bristol Co., Platts Bridge, Waterbury, Conn.
Brooke Engineering Co., Inc., 4517 Wayne Ave., Philadelphia, Pa.
Cooper Co., Clark, 159 Jefferson St., Philadelphia, Pa.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Cutler-Hammer, Inc., N. 12th St. and W. St. Paul Ave., Milwaukee, Wis.
Detroit Lubricator Co., 5900 Trumbull Ave., Detroit, Mich.
Fulton Sylphon Co., Knoxville, Tenn.
General Controls Co., 700 W. Ivy St., Glendale, Cal.
General Electric Co., Air Conditioning & Commercial Ref. Dept., Schenectady, N. Y.
Johnson Service Co., 507 E. Michigan St., Milwaukee, Wis.
Mason-Neilan Regulator Co., 1190 Adams St., Boston, Mass.
Minneapolis-Honeywell Regulator Co., 2701 Fourth Ave., South, Minneapolis, Minn.
Perfex Corp. (Controls Div.), 500 W. Oklahoma Ave., Milwaukee, Wis.
Powers Regulator Co., 2720 Greenview Ave., Chicago, Ill.
R-S Products Corp., Germantown Ave., at Wayne Junction, Philadelphia, Pa.
Tagliabue Mfg. Co., C. J., 540 Park Ave., Brooklyn, N. Y.
Taylor Instrument Companies, 95 Ames St., Rochester, N. Y.
Vapor Car Heating Co., Inc., 80 E. Jackson Blvd., Chicago, Ill.

MUSHROOM VENTILATORS

(See Ventilators, Mushroom)

NIPPLES, PIPE

Brass and Copper

Acheson Mfg. Co., Braddock, P. O., Rankin, Pa.
Baker Ice Machine Co., Inc., 1508 Evans St., Omaha, Neb.
Chase Brass & Copper Co., 236 Grand St., Waterbury, Conn.
Chicago Nipple Mfg. Co., 1966 Southport Ave., Chicago, Ill.
Crane Co., 836 S. Michigan Ave., Chicago Ill.
Devlin Mfg. Co., Inc., Thos., Burlington, N. J.
Flagg & Co., Inc., Stanley G., 1421 Chestnut St., Philadelphia, Pa.
Grabler Mfg. Co., 6565 Broadway, Cleveland, O.
Grinnell Co., Inc., 260 W. Exchange, Providence, R. I.
Imperial Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.
Jarecki Mfg. Co., 1345 W. 12th St., Erie, Pa.
Jenkins Mfg. Co., 2 W. 45th St., New York, N. Y.
Limbert & Co., Geo. B., 570 Fulton St., Chicago, Ill.
Mueller Brass Co., Lapeer Ave., Port Huron, Mich.
Parker Appliance Co., The, 17325 Euclid Ave., Cleveland, O.
Penn Mfg. Corp. of Washington, Pa., 380 W. Chestnut St., P. O. Box 484, Washington, Pa.
Phoenix Brass Fittings Corp., Colt St., & Chancellor Ave., Irvington, N. J.
Pittsburgh Valve & Fittings Corp., Barberton, O.
Rockford Brass Works, 700 S. Main St., Rockford, Ill.
Roessing Mfg. Co., 1616 Noble St., Sharpsburg Sta., Pittsburgh, Pa.
Shaw-Kendall Engineering Co., The, 120-130 S. Superior St., Toledo, O.
Streamline Pipe & Fittings Div., Mueller Brass Co., 1925 Lapeer Ave., Port Huron, Mich.
Walworth Co., 60 E. 42nd St., New York, N. Y.
Ward Foundries, Inc.. J. P., Blossburgh, Pa.
Weatherhead Co., 300 E. 131st St., Cleveland, O.

NIPPLES

Iron and Steel

Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
Alloy Steel Products Co., 1000 W. Elizabeth Ave., Linden, N. J.
Byers Co., A. M., Clark Bldg., Pittsburgh, Pa.
Chicago Nipple Mfg. Co., 1966 Southport Ave., Chicago, Ill.
Colonial Alloys Co., Specialties Div., Trenton Ave. and Reading R.R., Philadelphia, Pa.
Crane Co., 836 S. Michigan Ave., Chicago Ill.
Detroit Brass & Malleable Wks., 100 S. Campbell, Detroit, Mich.
Devlin Mfg. Co., Inc., Thos., Burlington, N. J.
Dresser Mfg. Co., 490 Fisher Ave., Bradford, Pa.
Flagg & Co., Inc., Stanley G., 1421 Chestnut St., Philadelphia, Pa.
Grabler Mfg. Co., 6565 Broadway, Cleveland, O.
Grinnell Co., Inc., 260 W. Exchange, Providence, R. I.
Hasco Valve & Machine Co., 1819 W. St. Paul Ave., Milwaukee, Wis.
Illinois Malleable Iron Co., 1801 Diversey Ave., Chicago, Ill.
Jarecki Mfg. Co., 1345 W. 12th St., Erie, Pa.
Limbert & Co., Geo. B., 570 Fulton St., Chicago, Ill.
Penn Mfg. Corp. of Washington, Pa., 380 W. Chestnut St., P. O. Box 484, Washington, Pa.
Pittsburgh Valve & Fittings Corp., Barberton, O.
Shaw-Kendall Engineering Co., The, 120-130 S. Superior St., Toledo, O.
Walworth Co., 60 E. 42nd St., New York, N. Y.
Ward Foundries, Inc.. J. P., Blossburgh, Pa.

NON-FERROUS HEATING SURFACE

(See Surface, Heating Indirect, Non-Ferrous)

NOZZLES, SPRAY

Baker Ice Machine Co., Inc., 1508 Evans St., Omaha, Neb.
Balloffet Dies and Nozzle Co., Inc., 45-51 Adams St., Guttenberg, N. J.
Bayley Blower Co., 1817 S. 66th St., Milwaukee, Wis.
Benjamin Air Rifle Co., 1525 S. 8th St., St. Louis, Mo.
Betz Air Conditioning Corp., 1820 Wyandotte St., Kansas City, Mo.
Binks Mfg. Co., 3114-40 Carroll Ave., Chicago, Ill.
Blower Application Co., 918 N. Fourth St., Milwaukee, Wis.
Buffalo Forge Co., 171 Mortimer St., Buffalo, N. Y.
Burhorn Co., Edwin, 1 Newark St., Hoboken, N. J.
Century Engineering Corp., 401-431 3rd St., S. E., Cedar Rapids, Ia.
Chain Belt Co., 1644 W. Bruce, Milwaukee, Wis.
Clarage Fan Co., Porter St., Kalamazoo, Mich.
DeVilbiss Co., The, 300 Phillips Ave., Toledo, O.
Dustlix Corp., 715 N. Van Buren St., Milwaukee, Wis.
Fluor Corp., Ltd., The, 909 E. 59th St., Los Angeles, Cal.
General Scientific Equipment Co., 2735 N. Broad St., Philadelphia, Pa.
Howell Mfg. Co., 1341 Montgall, Kansas City, Mo.
International Moistening Co., 489 S. Main St., Providence, R. I.
Johnson Tool Co., 65-67 Massasoit Ave., East Providence, R. I.
Link-Belt Co., 307 N. Michigan Ave., Chicago, Ill.
Marley Co., 3001 Fairfax Rd., Kansas City, Mo.
Martocello & Co., Jos. A., 229 N. 13th St., Philadelphia, Pa.
Milburn Co., Alexander, 1426 W. Baltimore St., Baltimore, Md.
Monarch Mfg. Wks., Inc., Salmon & Westmoreland Sts., Philadelphia, Pa.
Northern Indiana Brass Co., 935 Plum St., Elkhart, Ind.
Parks-Cramer Co., 970 Main St., Fitchburg, Mass.
Penn Cooling Tower Wks., 1337 Nixon St., Pittsburgh, Pa.
Peterson Freezem Mfg. & Sales Co., 2620 Charlotte Ave., Kansas City, Mo.
Phillips Cooling Tower Co., Inc., 15 John St., New York, N. Y.
Preferred Utilities Mfg. Corp., 33 W. 60th St., New York, N. Y.
Rega Mfg. Co., 79 Mt. Hope Ave., Rochester, N. Y.
Rockwood Sprinkler Co., 38 Harlow St., Worcester, Mass.
Ross Sprinkler Co., 34 Roberts St., Pasadena, Cal.
Schubert-Christy Corp., Box 166, Affton Station, St. Louis. Mo.
Schutte & Koerting Co., 12th and Thompson Sts., Philadelphia, Pa.
Skinner Irrigation Co., 1212 E. Canal St., Troy, O.
Spray Engineering Co., 114 Central St., Somerville, Mass.
Spraying Systems Co., 4033 W. Lake St., Chicago, Ill.
Strandwitz & Co., Inc.. W. J., Jefferson and Master Sts., Camden, N. J.
Sturtevant Co., B. F., Damon St., Hyde Park, Boston, Mass.
Supreme Electric Products Corp., 99 Mt. Hope Ave., Rochester, N. Y.
Westinghouse Electric & Mfg. Co., Springfield, Mass.
Yarnall-Waring Co., Chestnut Hill, Philadelphia, Pa.

ODOR ADSORBERS

(See Adsorbers, Odor)

OIL BURNERS

(See Burners, Oil)

OIL PREHEATERS

(See Preheaters, Fuel Oil)

OIL TANKS

(See Tanks, Metal, Fuel Oil)

ORIFICES

Radiator and Pipe

Barnes & Jones, Inc., 128 Brookside Ave., Jamaica Plain, Boston, Mass.
Bell & Gossett Co., 3000 Wallace St., Chicago, Ill.
Detroit Lubricator Co., 5900 Trumbull Ave., Detroit, Mich.
Dunham Co., C. A., 450 E. Ohio St., Chicago, Ill.
Haines & Co., William S., 12th and Buttonwood Sts., Philadelphia, Pa.
Herske & Timmis, Inc., 33 W. 60th St., New York, N. Y.
Illinois Engineering Co., 2035 S. Racine Ave., Chicago, Ill.
Marsh Tritrol Co., 600 S. Michigan Ave., Chicago, Ill.
Milwaukee Valve Co., S. Burrell St., at E. Hays Ave., Milwaukee, Wis.
New York Air Valve Corp., 611-621 Broadway, New York, N. Y.
Sarco Co., Inc., 183 Madison Ave., New York, N. Y.
Spence Engineering Co., Inc., 28 Grant St., Walden, N. Y.
Tallmadge & Co., Webster, 255 N. 18th St., East Orange, N. J.
Thrush & Co., H. A., 21 E. Riverside Dr., Peru, Ind.
Trane Co., The, La Crosse, Wis.
Webster & Co., Warren, 17th & Federal Sts., Camden, N. J.

OZONE EQUIPMENT

American Hydrozone Co., Inc., 10 E. 40th St., New York, N. Y.
Automatic Pump & Softener Corp., 1907 Kishwaukee St., Rockford, Ill.
Chelsea Fan & Blower Co., 370 W. 15th St., New York, N. Y.
Corozone Air Conditioning Corp., 1422 Euclid Ave., Cleveland, O.
Electroaire Corp., 1455-57 W. Congress St., Chicago, Ill.
Kisco Co., Inc., 39th and Chouteau Ave., St. Louis, Mo.
Lohman, Inc., Wm. J., 62 Ninth Ave., New York, N. Y.
Lowell Air Conditioning Corp., Otis Bldg., Philadelphia, Pa.
Montgomery Bros., 61 Fremont St., San Francisco, Cal.
Norwood Filtration Co., The, N. Maple St., Florence, Mass.
Ozone Air Co., 942 Cherry St., S. E., Grand Rapids, Mich.
Ozo-Ray Process Corp., 400 N. Sangamon St., Chicago, Ill.
Russell Electric Co., 348 W. Huron St., Chicago, Ill.
Sealkote Corp., 40 S. Clinton St., Chicago, Ill.
United States Ozone Co. of America, Crescent St., Scottdale, Pa.

PIPE, ALUMINUM

Aluminum Co. of America, 801 Gulf Bldg., Pittsburgh, Pa.

PIPE, ASBESTOS CEMENT

Atlas Asbestos Co., Ltd., 110 McGill St., Montreal, Que.. Canada.
Johns-Manville, 22 E. 40th St., New York, N. Y.
Keasbey & Mattison Co., Butler Ave., Ambler, Pa.
Standard Asbestos Mfg. Co., 820-822 W. Lake St., Chicago, Ill.
Standard Fuel Engineering Co., 667 Post Ave., South, Detroit, Mich.

Union Asbestos & Rubber Co., 54th Ave., and 18th St., Cicero, Ill.

PIPE, BRASS and COPPER

American Brass Co., 414 Meadow St., Waterbury, Conn.
Bridgeport Brass Co., E. Main St., Bridgeport, Conn.
Chase Brass & Copper Co., 236 Grand St., Waterbury, Conn.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Foster Wheeler Corp., 165 Broadway, New York, N. Y.
Hussey & Co., C. G., 2850 Second Ave., Pittsburgh, Pa.
Mueller Brass Co., Lapeer Ave., Port Huron, Mich.
Phelps Dodge Copper Products Corp., British American Tube Div., 40 Wall St., New York, N. Y.
Revere Copper and Brass Incorporated, 230 Park Ave., New York, N. Y.
Scovill Mfg. Co., Waterville Div., Waterville, Conn.
Streamline Pipe & Fittings Div., Mueller Brass Co., Port Huron, Mich.
United States Brass & Copper Co., Hyde Park Ave., Hyde Park, Boston, Mass.
Wolverine Tube Co., 1455 Central Ave., Detroit, Mich.

PIPE CLAMPS

(See Clamps, Beam)

PIPE CONDUIT

(See Conduit for Underground Pipe)

PIPE COUPLINGS

(See Couplings, Pipe)

PIPE FLANGES

(See Flanges, Pipe)

PIPE HANGERS

(See Hangers, Pipe)

PIPE JOINT COMPOUNDS

(See Compounds, Pipe Joint)

PIPE, LINED

Alpha Metal & Rolling Mills, Inc., 363 Hudson Ave., Brooklyn, N. Y.
American Brass Co., 414 Meadow St., Waterbury, Conn.
American Cast Iron Pipe Co., 2930 N. 16th St., Birmingham, Ala.
American Hard Rubber Co., 11 Mercer St., New York, N. Y.
Cohoes Rolling Mill Co., Canvass and Cortland Sts., Cohoes, N. Y.
Columbia Steel Co., United States Steel Corp. Sub., 235 Montgomery St., San Francisco, Cal. St., Akron, O. (Rubber-lined)
Goodrich Co., B. F., 548 S. Main St., Akron, O.
Jones & Laughlin Steel Corp., Third & Ross St., Pittsburgh, Pa.
Lead Lined Iron Pipe Co., 1 Broadway, Wakefield, Mass.
Luzerne Rubber Co., Muirhead Ave., Trenton, N. J.
Manhattan Rubber Mfg. Div., of Raybestos-Manhattan, Inc., 61 Willett St., Passaic, N. J.
National Lead Co., 111 Broadway, New York, N. Y.
National Tube Co., United States Steel Corp. Sub., Frick Bldg., Pittsburgh, Pa.
Public Works Supply Co., 93 Brookline St., Lynn, Mass.
Resisto Pipe & Valve Co., 262 Bridge St., East Cambridge, Mass.
United States Rubber Co., 1790 Broadway, New York, N. Y.
Vitreous Enameling & Stamping Co., 1381 Sedgwick Ave., New York, N. Y.
Warren Foundry & Pipe Corp., 11 Broadway, New York, N. Y.
Williams-Wallace Co., 160 Hooper St., San Francisco, Cal.
Youngstown Sheet & Tube Co., 602 Stambaugh Bldg., Youngstown, O.

PIPE NIPPLES

(See Nipples, Pipe)

PIPE ORIFICES

(See Orifices, Radiator and Pipe)

PIPE STRAINERS

(See Strainers, Pipe Line)

PIPE, STEEL

Butt and Lap Weld

Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 703 Curtis St., Middletown, O.
Baker Ice Machine Co., Inc., 1508 Evans St., Omaha, Neb.
Bethlehem Steel Co., Bethlehem, Pa.
Byers Co., A. M., Clark Bldg., Pittsburgh, Pa.
Central Tube Co., First National Bank Bldg., Pittsburgh, Pa.
Cohoes Rolling Mill Co., Canvass and Cortland Sts., Cohoes, N. Y.
Columbia Steel Co., United States Steel Corp. Sub., 235 Montgomery St., San Francisco, Cal.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Fretz-Moon Tube Co., P. O. Box 551, Butler, Pa.
Graver Tank & Mfg. Co., Inc., 4809 Todd Ave., East Chicago, Ill.
Jones & Laughlin Steel Corp., Third & Ross St., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., Rm. 1317, St. Louis, Mo.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Pittsburgh Tube Co., Vandergrift Bldg., Pittsburgh, Pa.
Republic Steel Corp., Republic Bldg., Cleveland, O.
Ryerson & Son, Inc., Jos. T., 2558 W. 16th St., Chicago, Ill.
South Chester Tube Co., Front & Thurlow Sts., Chester, Pa.
Spang Chalfant, Inc., Div. of National Supply Co., Grant Bldg., Pittsburgh, Pa.
Taylor Forge & Pipe Wks., P. O. Box 485, Chicago, Ill.
United States Steel Corp., 436 Seventh Ave., Pittsburgh, Pa.
Wheatland Tube Co., 606-608 Real Estate Trust Bldg., Philadelphia, Pa.
Wheeling Steel Corp., Wheeling Steel Corp. Bldg., Wheeling, W. Va.
Youngstown Sheet & Tube Co., 602 Stambaugh Bldg., Youngstown, O.

Seamless

Babcock & Wilcox Co., 85 Liberty St., New York, N. Y.
Columbia Steel Co., United States Steel Corp. Sub., 235 Montgomery St., San Francisco, Cal.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Jones & Laughlin Steel Corp., Third & Ross St., Pittsburgh, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Pittsburgh Steel Co., Grant Bldg., Pittsburgh, Pa.
Ryerson & Son, Inc., Jos T., 2558 W. 16th St., Chicago, Ill.
Spang Chalfant, Inc., Div. of National Supply Co., Grant Bldg., Pittsburgh, Pa.
United States Steel Corp., 436 Seventh Ave., Pittsburgh, Pa.
Youngstown Sheet & Tube Co., 602 Stambaugh Bldg., Youngstown, O.

PIPE UNIONS

(See Unions, Pipe)

PIPE, WOOD

American District Steam Co., Bryant St., North Tonawanda, N. Y.
Caldwell Co., W. E., 2120 Brook St., Louisville, Ky.
Michigan Pipe Co., 503 Phoenix Bldg., Bay City, Mich.
Wykoff & Son Co., A., 100 Home St., Elmira, N. Y.

PIPE, WROUGHT IRON

Baker Ice Machine Co., Inc., 1508 Evans St., Omaha, Neb.
Byers Co., A. M., Clark Bldg., Pittsburgh, Pa.
Cohoes Rolling Mill Co., Canvass and Cortland Sts., Cohoes, N. Y.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Roessing Mfg. Co., 1616 Noble St., Sharpsburg Sta., Pittsburgh, Pa.
South Chester Tube Co., Front & Thurlow Sts., Chester, Pa.

PITOT TUBES

American Meter Co., Inc., 60 E. 42nd St., New York, N. Y.
Bacharach Industrial Instrument Co., 7000 Bennett St., Pittsburgh, Pa.
Defender Automatic Regulator Co., 308 S. 8th St., St. Louis, Mo.
Detroit Air Meter Co., Box 1473, Detroit, Mich.
Foxboro Co., 106 Neponset Ave., Foxboro, Mass.
Friez & Sons, Julien P., 4 N. Central Ave., Baltimore, Md.
Hill, E. Vernon, 6826 W. Highland Ave., Chicago, Ill.
Meriam Co., The, 1955 W. 112th St., Cleveland, O.

PLATES

Floor and Ceiling

Aluminum Co. of America, 801 Gulf Blvd., Pittsburgh, Pa.
American Radiator & Standard Sanitary Corp., Bessemer Bldg., Pittsburgh, Pa.
Beaton & Cadwell Mfg. Co., 185 Main St., New Britain, Conn.
Beaton & Corbin Mfg. Co., Southington, Conn.
Chicago Nipple Mfg. Co., 1966 Southport Ave., Chicago, Ill.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Farley Sleeve & Hanger Co., 3748 E. 71st St., Cleveland, O.
Fee & Mason Mfg. Co., Inc., 81 Beekman St., New York, N. Y.
Globe Machine & Stamping Co., 1250 W. 76th St., Cleveland, O.
Grabler Mfg. Co., 6565 Broadway, Cleveland, O.
Grinnell Co., Inc., 260 W. Exchange, Providence, R. I.
Jarecki Mfg. Co., 1345 W. 12th St., Erie, Pa.
Keeney Mfg. Co., Main St., Newington, Conn
Little Mfg. Co., M. S., 151 New Park Ave., Hartford, Conn.
Pittsburgh Valve & Fittings Corp., Barberton, O.
Ravena Iron Co., Ravena, N. Y.
Russell Mfg. Co., John M., Naugatuck, Conn.

PREHEATERS, FUEL OIL

American District Steam Co., Bryant St., North Tonawanda. N. Y.
Bell & Gossett Co., 3000 Wallace St., Chicago, Ill.
Bros Boiler & Mfg. Co., Wm., Nicollet Island, Minneapolis, Minn.
Davis Engineering Corp., 1064 E. Grand St., Elizabeth, N. J.
Engineer Co., 17 Battery Pl., New York, N. Y.
Frank Heaters, Inc., 150 Railroad Ave., Paterson, N. J.
General Fittings Co., 123 Georgia Ave., Providence, R. I.
Griscom-Russell Co., The, 285 Madison Ave., New York, N. Y.
Hotstream Heater Co., The, 8007 Grand Ave., Cleveland, O.
Hynes Electric Heating Co., 210 Cherry St., Philadelphia, Pa.
Johnson Corp., 830 Wood St., Three Rivers, Mich.
National Pipe Bending Co., 122 River Street, New Haven, Conn.
Pan American Engineering Co., 820 Parker St., Berkeley, Cal.
Patterson-Kelley Co., Inc., East Stroudsburg, Pa.
Richmond Engineering Co., Inc., 7th & Hospital Sts., Richmond, Va.
Ross Heater & Mfg. Co., Inc., 1407 West Ave., Buffalo, N. Y.
Staples & Pfeiffer, Ltd., 528 Bryant St., San Francisco, Cal.
Taco Heaters, Inc., 342 Madison Ave., New York, N. Y.
Trent Co., Harold E., 55th St. & Wyalusing Ave., Philadelphia, Pa.
Viscostat Co., 30 N. La Salle St., Chicago, Ill.
Vulcan Electric Co., Lynn, Mass.
Warren Electric Appliance Co., Warren Bank & Trust Co. Bldg., Warren, Pa.
Whitlock Mfg. Co., 100 South St., Hartford, Conn.
Wiegand Co., Edwin L., 7500 Thomas Blvd., Pittsburgh, Pa.

PRESSURE BLOWERS

(See Blowers, Pressure)

PRESSURE GAGES

(See Gages, Pressure Indicating)

PRESSURE RECORDERS

(See Recorders, Vacuum and Pressure)

PRESSURE REDUCING VALVES

(See Valves, Steam and Water, Pressure Reducing and Regulating)

PROTECTORS

For Pipe Covering

American District Steam Co., Bryant St., North Tonawanda, N. Y.
Carpenter & Paterson, Inc., 1190 Bennington St., East Boston, Mass.
Cheney Co., Architects' Bldg., Philadelphia, Pa.
Grinnell Co., Inc., 260 W. Exchange, Providence, R. I.
Wilson, Inc., Grant, 4115 W. Taylor St., Chicago, Ill.

PSYCHROMETERS

Friez & Sons, Julien P., 4 N. Central Ave., Baltimore, Md.
G. M. Mfg. Co., P. O. Box 151, Madison Square Sta., New York, N. Y.
General Scientific Equipment Co., 2735 N. Broad St., Philadelphia.
H-B Instrument Co., 2518 N. Broad St., Philadelphia, Pa
Hill, E. Vernon, 6826 W. Highland Ave., Chicago, Ill.
Johnson Service Co., 507 E. Michigan St., Milwaukee, Wis.
Moeller Instrument Co., 132nd St. & 89th Ave., Richmond Hill, N. Y.
Palmer Co., 2501 Norwood Ave., Cincinnati (Norwood), O.
Parks-Cramer Co., 970 Main St., Fitchburg, Mass.
Precision Thermometer & Instrument Co., 1434 Brandywine St., Philadelphia, Pa.
Scientific Instrument Co., 531-35 W. Larned St., Detroit, Mich.
Tagliabue Mfg. Co., C. J., 540 Park Ave., Brooklyn, N. Y.
Taylor Instrument Companies, 95 Ames St., Rochester, N. Y.
Trerice Co., H. O., 1420 W. Lafayette Blvd., Detroit, Mich.

PUMP GOVERNORS

(See Governors, Pumps)

PUMPS

Centrifugal (C), and Condensation Return (R)

Aldrich Pump Co., 4 Pine St., Allentown, Pa. (C) (R)
Allis-Chalmers Mfg. Co., 1126 S. 70th St., Milwaukee, Wis. (C)
American Marsh Pumps, Inc., 100 Capital Ave., N. E., Battle Creek, Mich. (C) (R)
American Well Wks., 100 N. Broadway, Aurora, Ill. (C)
Aurora Pump Co., 619 Loucks St., Aurora, Ill. (C) (R)
Austin-Mason Co., 15 Park Row, New York, N. Y. (C)
Barret, Haentjens & Co., Hazelton, Pa. (C)
Beach-Russ Co., 60A Church St., New York, N. Y. (C)
Berns Specialty Co., 1015 Lake St., Chicago, Ill. (C)

Blaisdell Compressor Co., 227 Fulton St., New York, N. Y. (C)
Buffalo Pumps, Inc., 480 Broadway, Buffalo, N. Y. (C) (R)
Byron Jackson Co., 2150 E. Slauson Ave., Los Angeles, Cal. (C) (R)
Chain Belt Co., 1644 W. Bruce St., Milwaukee, Wis. (C)
Chicago Pump Co., 2325 Wolfram St., Chicago, Ill. (C) (R)
Cissell Mfg. Co., Wm. M., 831 S. First St., Louisville, Ky. (R)
Columbus Steam Pump Wks. Co., 724 W. Gay St., Columbus, O. (C) (R)
Davidson Co., M. T., 154 Nassau St., New York, N. Y. (C) (R)
Dayton-Dowd Co., 115-17 York St., Quincy, Ill. (C) (R)
Dean Brothers Pumps Inc., 323 W. 10th St., Indianapolis, Ind. (C) (R)
Dean Hill Pump Co., 23rd & St. Charles St., Anderson, Ind. (C) (R)
Decatur Pump Co., 2750 Nelson Park Rd., Decatur, Ill. (C) (R)
DeLaval Steam Turbine Co., 300 Nottingham Way, Trenton, N. J. (C) (R)
Deming Co., 14 Aetna St., Salem, O. (C) (R)
Domestic Engine & Pump Co., Shippensburg, Pa. (C) (R)
Dunham Co., C. A., 450 E. Ohio St., Chicago, Ill. (C) (R)
Eclipse Fuel Engineering Co., 707 S. Main St., Rockford, Ill. (R)
Economy Pumps, Inc., 2522 W. Congress St., Chicago, Ill. (C) (R)
Everite Pump & Mfg. Co., Inc., 619 N. Prince St., Lancaster, Pa. (C)
Fairbanks, Morse & Co., 600 Michigan Ave., Chicago, Ill. (C) (R)
Foster Pump Works, Inc., 46A Washington St., Brooklyn, N. Y. (C) (R)
Foster Wheeler Corp., 165 Broadway, New York, N. Y. (C)
Frederick Iron & Steel Co., E. 7th St., Frederick, Md. (C) (R)
Fulflo Specialties Co., Inc., The, Blanchester, O. (C)
Gardner-Denver Co., Gardner and First Aves., Quincy, Ill. (C)
Goulds Pumps, Inc., Fall St., Seneca Falls, N. Y. (C) (R)
Guild & Garrison, Inc., 43 Keap St., Brooklyn, N. Y. (C) (R)
Hammett Mfg. Co., 209 W. 19th Ter., Kansas City, Mo. (C)
Heating Assurance, Inc., 124 E. Augusta St., Spokane, Wash. (R)
Hoffman Specialty Co., Inc., Waterbury Natl. Bank Bldg., Waterbury, Conn.
Ingersoll-Rand, 11 Broadway, New York, N. Y. (C) (R)
Johnson Corp., 830 Wood St., Three Rivers, Mich. (R)
Kimball-Krogh Pump Div., Food Machinery Corp., 301 West Ave. 26, Los Angeles, Cal. (C)
Kingsford Foundry & Machine Wks., 264 W. Second St., Oswego, N. Y. (C)
Kisco Boiler & Engineering Co., 3732 Chouteau Ave., St. Louis, Mo. (R)
Kraissl Co., Inc., The, Terhune and Williams Aves., Hackensack, N. J. (C)
La Bour Pump Co., Inc., 1301 Sterling Ave., Elkhart, Ind. (C)
Lawrence Pump & Engine Co., P. O. Box 70, Lawrence, Mass. (C) (R)
Lecourtenay Co., 5 Maine St., Newark, N. J. (C) (R)
Leyman Manufacturing Corp., McGowan Co., John H., The, Div., 54-58 Central Ave., Cincinnati, O.
Lewis & Co., Inc., Chas. S., 2207 Pine St., St. Louis, Mo. (C) (R)
Luzerne Rubber Co., Muirhead Ave., Trenton, N. J. (Hard rubber) (C)
Micro-Westco, Inc., Bettendorf Office Bldg., Bettendorf, Ia. (C) (R)
Morehead Mfg. Co., 4895 Grand River Ave., Detroit, Mich. (R)
Morris Machine Wks., 50 E. Genesee St., Baldwinsville, N. Y. (C)
Myers & Bro. Co., F. E., The, Ashland, O. (C) (R)
Nash Engineering Co., South Norwalk, Conn. (C) (R)
National Steam Pump Co., 701 W. Johnson St., Upper Sandusky, O. (C) (R)
Oberdorfer Brass Co., M. L., 2307 Thompson Rd., Syracuse, N. Y. (C) (R)
Palmer Electric Co., 20 Sproat St., Detroit, Mich. (C)
Pennsylvania Pump & Compressor Co., Easton, Pa. (C)
Quimby Pump Co., Inc., 340 Thomas St., Newark, N. J. (C) (R)
Red Jacket Mfg. Co., Box 270, Davenport, Ia. (C)
Roots-Connersville Blower Corp., 16th St. & Columbia Ave., Connersville, Ind. (R)
Rumsey Pump Corp., Johnston St., Seneca Falls, N. Y. (C) (R)
Schaub Engineering Co., Fred H., 325 W. Huron St., Chicago, Ill. (R)
Schneible Co., Claude B., 3951 Lawrence Ave., Chicago, Ill. (C)
Skidmore Corp., St. Joseph, Mo. (R)
Smith Meter Co., 5743 E. Leneve St., Los Angeles, Cal. (C)
Sterling Engineering & Mfg. Corp., 117 Business St., Hyde Park, Mass. (R)
Sterling, Inc., 3738 N. Holton St., Milwaukee, Wis. (R)
Swaby Mfg. Co., 2330 W. Cermak Rd., Chicago, Ill. (C) (R)
Taber Pump Co., 272 Elm St., Buffalo, N. Y. (C)
Trane Co., The, La Crosse, Wis. (C) (R)
Triplex Heating Specialty Co., Inc., 131 E. Canal St., Peru, Ind.
Union Steam Pump Co., Jefferson Ave., Battle Creek, Mich. (C) (C)
Utility Fan Corp., 2528 Santa Fe Ave., Los Angeles, Cal. (C)
Warren Steam Pump Co., Inc., Warren, Mass. (C) (R)
Weil Pump Co., 215 17 W. Superior St., Chicago, Ill. (C) (R)
Weinman Pump Co., 290 Spruce St., Columbus, O. (C) (R)
Wheeler Mfg. Co., C. H., 19th, Lehigh & Sedgley Aves., Philadelphia, Pa. (R)
Wintroath Pumps, Ltd., 1100 S. Meridian Ave., Alhambra, Cal.
Worthington Pump & Machinery Corp., Harrison, N. J. (C) (R)
Yeomans Bros. Co., 1433 N. Dayton St., Chicago, Ill. (C) (R)

PUMPS

Reciprocating (R) and Steam (S)

Air-O-Line Co., The, 1101-1107 McKinney, Dallas, Tex.
Aldrich Pump Co., 4 Pine St., Allentown, Pa. (R)
Allis-Chalmers Mfg. Co., 1126 S. 70th St., Milwaukee, Wis. (R)
Alten's Foundry & Machine Works, 226 W. Wheeling St., Lancaster, O.
American-Marsh Pumps, Inc., 100 Capital Ave., N. E., Battle Creek, Mich. (R) (S)
Austin-Mason Co., 15 Park Row, New York, N. Y. (R) (S)
Columbus Steam Pump Wks., 724 W. Gay St., Columbus, O. (R)
Davidson Co., M. T., 154 Nassau St., New York, N. Y. (R) (S)
Dean Brothers Pumps Inc., 323 W. 10th St., Indianapolis, Ind. (R) (S)
Delco Appliance Div., General Motors Sales Corp., Rochester, N. Y.
Deming Co., 14 Aetna St., Salem, O. (R)
Domestic Engine & Pump Co., Shippensburg, Pa. (R) (S)
Duro Co., 537-40 E. Monument Ave., Dayton, O. (R)
Everite Pump & Mfg. Co., Inc., 619 N. Prince St., Lancaster, Pa. (R)
Fairbanks, Morse & Co., 600 Michigan Ave., Chicago, Ill. (R) (S)
Foster Pump Wks., Inc., 46A Washington St., Brooklyn, N. Y. (R) (S)
Gardner-Denver Co., Gardner and First Aves., Quincy, Ill. (R) (S)
Goulds Pumps, Inc., Fall St., Seneca Falls, N. Y. (R)
Guild & Garrison, Inc., 43 Keap St., Brooklyn, N. Y. (R) (S)
Hammett Mfg. Co., 209 W. 19th Ter. Kansas City, Mo. (R)

Now we are not only geographically closer to your needs, but our improved manufacturing and transportation facilities assure still better service.

And here, in Hamilton, Ohio, we have one of the most complete pump manufacturing plants, testing laboratories and engineering staffs in the world.

With greater efficiency in manufacture and lower transportation costs, it is obvious that dollar for dollar you now get greater value than ever before.

Sterling Pumps are manufactured for either Oil or Water Lubrication

Write—without obligations, for consultation with our engineering staff regarding your special pumping problems.

Homestead Valve Mfg. Co., P. O. Box 348, Coraopolis, Pa. (R)
Ingersoll-Rand, 11 Broadway, New York, N. Y. (R) (S)
Jacobsen Mfg. Co., Washington at 8th, Racine, Wis.
Leyman Manufacturing Corp., McGowan Co., John H., The, Div., 54-58 Central Ave., Cincinnati, O. (R) (S)
National Steam Pump Co., 701 W. Johnson St., Upper Sandusky, O. (R) (S)
Red Jacket Mfg. Co., Box 270, Davenport, Ia. (R)
Rumsey Pump Corp., Johnston St., Seneca Falls, N. Y. (R)
Uniflow Mfg. Co., E. Lake Rd., Erie, Pa. (R)
Union Steam Pump Co., Jefferson Ave., Battle Creek, Mich. (R) (S)
Warren Steam Pump Co., Inc., Warren, Mass. (S)
Weinman Pump Co., 290 Spruce St., Columbus, O. (R) (S)
Worthington Pump & Machinery Corp., Harrison, N. J. (R) (S)

PUMPS, DEEP WELL

Turbine Type

American-Marsh Pumps, Inc., 100 Capital Ave., N. E., Battle Creek, Mich.
American Well Works, 100 N. Broadway, Aurora, Ill.
Caldwell, Farley M., 521 W. Berry St., Fort Wayne, Ind.
Chandler Co., 804 First Ave., N. W., Cedar Rapids, Ia.
Columbus Steam Pump Wks. Co., 724 W. Gay St., Columbus, O.
Cook, Inc., A. D., Lawrenceburg, Ind.
Davidson Co., M. T., 154 Nassau St., New York, N. Y.
Delco Appliance Div., General Motors Sales Corp., Rochester, N. Y.
Deming Co., 14 Aetna St., Salem, O.
Duro Co., 537-40 E. Monument Ave., Dayton, O.
Everite Pump & Mfg. Co., Inc., 619 N. Prince St., Lancaster, Pa.
Fairbanks, Morse & Co., 600 Michigan Ave., Chicago, Ill.
Guild & Garrison, Inc., 43 Keap St., Brooklyn, N. Y.
Jacobsen Mfg. Co., Washington at 8th, Racine, Wis.
Kimball-Krogh Pump Div., Food Machinery Corp., 301 West Ave. 26, Los Angeles, Cal.
Layne & Bowler, Inc., Chelsea and University Aves., Memphis, Tenn.
Leyman Manufacturing Corp., McGowan Co., John H., The, Div., 54-58 Central Ave., Cincinnati, O.
Micro - Westco Inc., Bettendorf Office Bldg., Bettendorf, Ia.
Peerless Pump Div., Food Machinery Corp., 300 Walnut Rd., Massillon, O.
Pomona Pump Co., 206 E. Commercial St., Pomona, Cal.
Red Jacket Mfg. Co., Box 270, Davenport, Ia.
Roper Corp., Geo. D., Blackhawk Ave., Rockford, Ill.
Sterling Pump Corp., Hamilton, O.
Uniflow Mfg. Co., E. Lake Rd., Erie, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS, ROTARY

American Engineering Co., Aramingo Ave. & Cumberland St., Philadelphia, Pa.
American Hard Rubber Co., 11 Mercer St., New York, N. Y.
Beach-Russ Co., 60A Church St., New York, N. Y.
Blackmer Pump Co., 1809 Century Ave., S. W., Grand Rapids, Mich.
Bowser & Co., Inc., S. F., 1302 E. Creighton Ave., Fort Wayne, Ind.
Cooper Co., Clark, 159 Jefferson St., Philadelphia, Pa.
Davidson Co., M. T., 154 Nassau St., New York, N. Y.
De Laval Steam Turbine Co., 300 Nottingham Way, Trenton, N. J.
Deming Co., 14 Aetna St., Salem, O.
Fairbanks, Morse & Co., 600 Michigan Ave., Chicago, Ill.
Foster Pump Wks., Inc., 46A Washington St., Brooklyn, N. Y.
Gardner-Denver Co., Gardner and First Aves., Quincy, Ill.
Gould Pumps, Inc., Fall St., Seneca Falls, N. Y.
Ingersoll-Rand, 11 Broadway, New York, N. Y.
Kinney Mfg. Co., 3529 Washington St., Boston, Mass.
Kisco Boiler & Engrg. Co., 3732 Chouteau Ave., St. Louis, Mo.
Kraissl Co., Inc., The, Terhune and Williams Aves., Hackensack, N. J.
Lammert & Mann Co., 221 N. Wood St., Chicago, Ill.
Leyman Manufacturing Corp., McGowan Co., John H., The, Div., 54-58 Central Ave., Cincinnati, O.
Martocello & Co., Jos. A., 229 N. 13th St., Philadelphia, Pa.
Monarch Mfg. Wks., Inc., Salmon & Westmoreland Sts., Philadelphia, Pa.
Nash Engineering Co., South Norwalk, Conn.
Oberdorfer Brass Co., M. L., 2307 Thompson Rd., Syracuse, N. Y.
Quimby Pump Co., Inc., 340 Thomas St., Newark, N. J.
Red Jacket Mfg. Co., Box 270, Davenport, Ia.
Roots-Connersville Blower Corp., 16th St., & Columbia Ave., Connersville, Ind.
Roper Corp., Geo. D., Blackhawk Ave., Rockford, Ill.
Rumsey Pump Corp., Johnston St., Seneca Falls, N. Y.
Schutte & Koerting Co., 12th and Thompson Sts., Philadelphia, Pa.
Sundstrand Machine Tool Co., 2531 11th St., Rockford, Ill.
Taber Pump Co., 272 Elm St., Buffalo, N. Y.
Trimount Rotary Power Co., 391 Whiting Ave., East Dedham, Mass.
Tuthill Pump Co., 939 E. 95th St., Chicago, Ill.
Viking Pump Co., Fourth and State Sts., Cedar Falls, Ia.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS, SUMP

Allis-Chalmers Mfg. Co., 1126 S. 70th St., Milwaukee, Wis.
American-Marsh Pumps, Inc., 100 Capital Ave., N. E., Battle Creek, Mich.
American Well Wks., 100 N. Broadway, Aurora, Ill.
Aurora Pump Co., 619 Loucks St., Aurora, Ill.
Austin-Mason Co., 15 Park Row, New York, N. Y.
Buffalo Pumps, Inc., 480 Broadway, Buffalo, N. Y.
Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.
Chicago Pump Co., 2325 Wolfram St., Chicago, Ill.
Columbus Steam Pump Wks. Co., 724 W. Gay St., Columbus, O.
Davidson Co., M. T., 154 Nassau St., New York, N. Y.
Dayton-Dowd Co., 115-17 York St., Quincy, Ill.
Dean Brothers Pumps Inc., 323 W. 10th St., Indianapolis, Ind.
Dean Hill Pump Co., 23rd & St. Charles St., Anderson, Ind.
De Laval Steam Turbine Co., 300 Nottingham Way, Trenton, N. J.
Deming Co., 14 Aetna St., Salem, O.
Domestic Engine & Pump Co., Shippensburg, Pa.
Duro Co., 537-40 E. Monument Ave., Dayton, O.
Economy Pumps, Inc., 2522 W. Congress St., Chicago, Ill.
Everite Pump & Mfg. Co., Inc., 619 N. Prince St., Lancaster, Pa.
Fairbanks, Morse & Co., 600 Michigan Ave., Chicago, Ill.
Foster Pump Wks., Inc., 46A Washington St., Brooklyn, N. Y.
Frederick Iron & Steel Co., E. 7th St., Frederick, Md.
Goulds Pumps, Inc., Fall St., Seneca Falls, N. Y.
Guild & Garrison, Inc., 43 Keap St., Brooklyn, N. Y.
Imperial Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.
Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill.
Ingersoll-Rand, 11 Broadway, New York, N. Y.
Kimball-Krogh Pump Div., Food Machinery Corp., 301 West Ave. 26, Los Angeles, Cal.
Kingsford Foundry & Machine Wks., 264 W. Second St., Oswego, N. Y.
Kisco Boiler & Engineering Co., 3732 Chouteau Ave., St. Louis, Mo.
Lawrence Pump & Engine Co., P. O. Box 70, Lawrence, Mass.
Leyman Manufacturing Corp., McGowan Co., John H., The, Div., 54-58 Central Ave., Cincinnati, O.
Micro-Westco, Inc., Bettendorf Office Building, Bettendorf, Ia.
Morris Machine Wks., 50 E. Genesee St., Baldwinsville, N. Y.
Myers & Bro. Co., F. E., The, Ashland, O.
Nash Engineering Co., South Norwalk, Conn.
Oberdorfer Brass Co., M. L., 2307 Thompson Rd., Syracuse, N. Y.
Penberthy Injector Co., 1242 Holden Ave., Detroit, Mich.
Pomona Pump Co., 206 E. Commercial St., Pomona, Cal.
Quimby Pump Co., Inc., 340 Thomas St., Newark, N. J.
Red Jacket Mfg. Co., Box 270, Davenport, Ia.
Rumsey Pump Corp., Johnston St., Seneca Falls, N. Y.
Schutte & Koerting Co., 12th & Thompson Sts., Philadelphia, Pa.
Schneible Co., Claude B., 3951 Lawrence Ave., Chicago, Ill.
Sterling Pump Corp., Hamilton, O.
Swaby Mfg. Co., 2330 W. Cermak Rd., Chicago, Ill.
Taber Pump Co., 272 Elm St., Buffalo, N. Y.
Triplex Heating Specialty Co., Inc., 131 E. Canal St., Peru, Ind.
Uniflow Mfg. Co., E. Lake Rd., Erie, Pa.
Union Steam Pump Co., Jefferson, Ave., Battle Creek, Mich.
Weil Pump Co., 215-17 W. Superior St., Chicago, Ill.
Worthington Pump & Machinery Corp., Harrison, N. Y.
Yeomans Bros. Co., 1433 N. Dayton St., Chicago, Ill.

PUMPS, VACUUM HTG.

American-Marsh Pumps, Inc., 100 Capital Ave., N. E., Battle Creek, Mich.
Beach-Russ Co., 60A Church St., New York, N. Y.
Chicago Pump Co., 2325 Wolfram St., Chicago, Ill.
Columbus Steam Pump Works Co., 724 W. Gay St., Columbus, O.
Croll-Reynolds Engineering Co., Inc., 17 John St., New York, N. Y.
Dean Brothers Pumps, Inc., 323 W. 10th St., Indianapolis, Ind.
Domestic Engine & Pump Co., Shippensburg, Pa.
Dunham Co., C. A., 450 E. Ohio St., Chicago, Ill.
Economy Pumps, Inc., 2522 W. Congress St., Chicago, Ill.
Gardner-Denver Co., Gardner and First Aves., Quincy, Ill.
Guild & Garrison, Inc., 43 Keap St., Brooklyn, N. Y.
Gylstrom Co., O., 108 W. Wells St., Milwaukee, Wis.
Hoffman Specialty Co., Inc., Waterbury Natl. Bank Bldg., Waterbury, Conn.
Ingersoll-Rand, 11 Broadway, New York, N. Y.
Johnson Corp., 830 Wood St., Three Rivers, Mich.
Nash Engineering Co., South Norwalk, Conn.
Roots-Connersville Blower Corp., 16th St. & Columbia Ave., Connersville, Ind.
Skidmore Corp., St. Joseph, Mo.
Sterling, Inc., 3738 N. Holton St., Milwaukee, Wis.
Sterling Engineering & Mfg. Corp., 117 Business St., Hyde Park, Mass.
Weinman Pump Co., 290 Spruce St., Columbus, O.
Worthington Pump & Machinery Corp., Harrison, N. J.

PURGERS, REFRIGERANT

Armstrong Machine Works, 874 Maple St., Three Rivers, Mich.
Baker Ice Machine Co., Inc., 1508 Evans St., Omaha, Neb.
Frick Co., Waynesboro, Pa.
Howe Ice Machine Co., 2825 Montrose Ave., Chicago, Ill.

QUADRANTS, DAMPER

Adams Co., The, E. 4th St., Dubuque, Ia.
Air Control Products, Inc., Glades St. and Larch, Muskegon, Mich.
Goese Mfg. Co., 2548 N. 18th St., Milwaukee, Wis.
Green Colonial Furnace Co., 322 S. W. Third St., Des Moines, Ia.
Hart & Cooley Mfg. Co., Holland, Mich.
Kerentoff, G. L., 2803 Jefferson Ave., Cincinnati, O.
Milcor Steel Co., S. 41st & Burnham Sts., Milwaukee, Wis.
Northern Weatherstrip Co., 367 S. First Ave., E. Duluth, Minn.
Ohio Products Co., 16507 Lucille Ave., Cleveland, O.
Parker-Kalon Corp., 200 Varick St., New York, N. Y.
Sturtevant Co., B. F., Damon St., Hyde Park, Boston, Mass.
United States Register Co., Burnham St., Battle Creek, Mich.
Young Regulator Co., 4500 Euclid Ave., Cleveland, O.

RADIATOR AIR VENTS

(See Vents, Air, for Radiators)

RADIATOR HANGERS

(See Hangers, Radiator)

RADIATOR HUMIDIFIERS

(See Humidifiers, Radiator Attachment Type)

RADIATOR ORIFICES

(See Orifices, Radiator and Pipe)

RADIATOR VALVES

(See Valves, Radiator)

RADIATORS

Cast Iron

Direct (D), and Convectors (C)

American Radiator & Standard Sanitary Corp., Bessemer Bldg., Pittsburgh, Pa. (D) (C)
Burnham Boiler Corp., Main St., Irvington, N. Y. (D)
Clow & Sons, James B., 201-299 N. Talmon Ave., Chicago, Ill. (Gas fired) (D)
Columbia Radiator Co., 3400 Walnut St., McKeesport, Pa. (D)
Crane Co., 836 S. Michigan Ave., Chicago, Ill. (D) (C)
Fowler & Wolf Radiator Co., Oak & Carson Sts., Norristown, Pa., (D)
Hart & Crouse Corp., 301 Turner St., Utica, N. Y. (D)
International Heater Co., 101 Park Ave., Utica, N. Y. (D)
Logansport Radiator Equipment Co., 21st & Erie Ave., Logansport, Ind. (D)
National Radiator Co., 221 Central Ave., Johnstown, Pa. (D) (C)
Pierce, Butler Radiator Corp., 701 Nichols Ave., Syracuse, N. Y. (D)
Prox Co., Inc., Frank, 1201 S. First St., Terre Haute, Ind. (D)
Richmond Radiator Co., Gas Products Div., Uniontown, Pa. (D) (C)
Slater Mfg. Co., 24 Water St., Wakefield, Mass. (Baseboard) (D)
Smith Co., Inc., H. B., The, 57 Main, Westfield, Mass. (D) (C)
Thatcher Furnace Co., 39 St. Francis St., Newark, N. J. (D)
United States Radiator Corp., 1056 National Bank Bldg., Detroit, Mich. (D) (C)
Utica Radiator Corp., 2201 Dwyer Ave., Utica, N. Y. (D) (C)
Weil-McLain Co., 641 W. Lake St., Chicago, Ill. (D) (C)

RADIATORS

Non-Ferrous Convectors

American Radiator & Standard Sanitary Corp., Bessemer Bldg., Pittsburgh, Pa.
Bros Boiler & Mfg. Co., Wm., Nicollet Island, Minneapolis, Minn.

Bush Mfg. Co., 100 Wellington St., Hartford, Conn.
Commodore Heaters Corp., 11 W. 42nd St., New York, N. Y.
Dunham Co., C. A., 450 E. Ohio St., Chicago, Ill.
G. & O. Mfg. Co., 138 Winchester Ave., New Haven, Conn.
Grinnell Co., Inc., 260 W. Exchange, Providence, R. I.
Manufacturers Fin Coil Co., 2505-7 S. Pulaski Rd., Chicago, Ill.
McCord Radiator & Mfg. Co., 2587 E. Grand Blvd., Detroit, Mich.
McQuay, Inc., 1600 Broadway, N. E., Minneapolis, Minn.
Modine Mfg. Co., 17th St., Racine, Wis.
Palmer Mfg. Corp., Phoenix, Ariz.
Pierce, Butler Radiator Corp., 701 Nichols Ave., Syracuse, N. Y.
Refrigeration Economics Co., Inc., 1232 Second St., N. E., Canton, O.
Rome-Turney Radiator Co., Canal St., Rome, N. Y.
Shaw-Perkins Mfg. Co., Oliver Bldg., Pittsburgh, Pa.
Sturtevant Co., B. F., Damon St., Hyde Park, Boston, Mass.
Super Radiator Corp., 320 Plymouth Bldg., Minneapolis, Minn.
Trane Co., The, La Crosse, Wis.
Tuttle & Bailey, Inc., Corbin Ave., New Britain, Conn.
Vapor Car Heating Co., Inc., 80 E. Jackson Blvd., Chicago, Ill.
Vulcan Radiator Co., 26 Francis Ave., Hartford, Conn.
Webster & Co., Warren, 17th & Federal Sts., Camden, N. J.
Young Radiator Co., 709 S. Marquette St., Racine, Wis.

RADIATORS
Electric-Steam

Acme Electric Heating Co., Inc., 1217 Washington St., Boston, Mass.
Air Control Corp. of New York, 500 E. 20th St., New York, N. Y.
Bros Boiler & Mfg Co., Wm., Nicollet Island, Minneapolis, Minn.
Burnham Boiler Corp., Main St., Irvington, N. Y.
General Electric Co., 1 River Rd., Schenectady, N. Y.
Trent Co., Harold E., 55th St. & Wyalusing Ave., Philadelphia, Pa.
Wiegand Co., Edwin L., 7500 Thomas Blvd., Pittsburgh, Pa.

RADIATORS
Gas-Steam

American Radiator & Standard Sanitary Corp., Bessemer Bldg., Pittsburgh, Pa.
Automatic Gas Equipment Co., 301 Brushton Ave., Pittsburgh, Pa.
Bunnell & Co., J. H., 215 Fulton St., New York, N. Y.
Burnham Boiler Corp., Main St., Irvington, N. Y.
Clow & Sons, James B., 201-299 N. Talmon Ave., Chicago, Ill.
Hammel Radiator Corp., 8980 Santa Monica Blvd., Los Angeles, Cal.
Pacific Gas Radiator Co., 7615 Roseberry Ave., Huntington Park, Cal.
Slattery & Bro., J. B., Inc., 171 Wallabout St., Brooklyn, N. Y.
United States Radiator Corp., 1056 National Bank Bldg., Detroit, Mich.

RADIATORS
Humidifying

Burnham Boiler Corp., Main St., Irvington, N. Y.
Utica Radiator Corp., 2201 Dwyer Ave., Utica, N. Y.

RECORDER-CONTROLLERS
Temperature and Humidity
Humidity (H), Temperature (T), Combined Humidity and Temperature (H&T)

Barber-Colman Co., 225 Loomis St., Rockford, Ill. (H)
Bristol Co., Platts Bridge, Waterbury, Conn. (H) (HT) (T)
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., 4534 Wayne Ave., Philadelphia, Pa. (H) (HT) (T)
Electric Auto-Lite Co., Moto Meter Gauge & Equipment Div., Caledonia & Gillette Sts., La Crosse, Wis. (T)
Foxboro Co., 106 Neponset Ave., Foxboro. Mass. (H) (HT) (T)
Johnson Service Co., 507 E. Michigan St., Milwaukee, Wis. (H) (T)
Leeds & Northrup Co., 4970 Stenton Ave., Philadelphia, Pa. (H) (HT) (T)
Manning, Maxwell & Moore, Inc., American Schaeffer & Budenberg Instrument Div., 11 Elias St., Bridgeport, Conn. (H) (HT) (T)
Mason-Neilan Regulator Co., 1190 Adams St., Boston, Mass. (H) (HT) (T)
Minneapolis-Honeywell Regulator Co., 2701 Fourth Ave., South, Minneapolis, Minn.
Powers Regulator Co., 2720 Greenview Ave., Chicago, Ill. (H) (HT) (T)
Pyrometer Instrument Co., 103 Lafayette St., New York, N. Y. (T)
Scientific Instrument Co., 531-35 W. Larned, Detroit, Mich.
Tagliabue Mfg. Co., C. J., 540 Park Ave., Brooklyn, N. Y. (H) (HT) (T)
Taylor Instrument Companies, 95 Ames St., Rochester, N. Y. (H) (HT) (T)
Thwing-Albert Instrument Co., 3339 Lancaster Ave., Philadelphia, Pa. (T)
Trerice Co., H. O., 1420 W. Lafayette Blvd., Detroit, Mich. (H) (HT) (T)
Wheelco Instruments Co., 1933 S. Halsted St., Chicago, Ill. (T)

RECORDER-CONTROLLERS
Pressure and Vacuum

Ashton Valve Co., 161—1st St., Cambridge, Mass.
Bacharach Industrial Instrument Co., 7000 Bennett St., Pittsburgh, Pa.
Bailey Meter Co., 1050 Ivanhoe Rd., Cleveland, O.
Bristol Co., Platts Bridge, Waterbury, Conn.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., 4534 Wayne Ave., Philadelphia, Pa.
Defender Automatic Regulator Co., 308 S. 8th St., St. Louis, Mo.
Electric Auto-Lite Co., Moto Meter Gauge & Equipment Div., Caledonia & Gillette Sts., La Crosse, Wis.
Foxboro Co., 106 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4970 Stenton Ave., Philadelphia, Pa.
Manning, Maxwell & Moore, Inc., American Schaeffer & Budenberg Instrument Div., 11 Elias St., Bridgeport, Conn.
Marsh, Corp., Jas. P., 2089 Southport Ave., Chicago, Ill.
Mason-Neilan Regulator Co., 1190 Adams St., Boston, Mass.
Moeller Instrument Co., 132nd St. & 89th Ave., Richmond Hill, N. Y.
Republic Flow Meters Co., 2240 Diversey Pkwy., Chicago, Ill.
Scientific Instrument Co., 531-35 W. Larned, Detroit, Mich.
Tagliabue Mfg. Co., C. J., 540 Park Ave., Brooklyn, N. Y.
Taylor Instrument Companies, 95 Ames St., Rochester, N. Y.
Trerice Co., H. O., 1420 W. Lafayette Blvd., Detroit, Mich.
Uehling Instrument Co., 473 Getty Ave., Paterson, N. J.
Wheelco Instruments Co., 1933 S. Halsted St., Chicago, Ill.

RECORDERS
Carbon Dioxide

Bacharach Industrial Instrument Co., 7000 Bennett St., Pittsburgh, Pa.
Bailey Meter Co., 1050 Ivanhoe Rd., Cleveland, O.
Bristol Co., Platts Bridge, Waterbury, Conn.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., 4534 Wayne Ave., Philadelphia, Pa.
Defender Automatic Regulator Co., 308 S. 8th St., St. Louis, Mo.
Engelhard, Inc., Charles, 90 Chestnut St., Newark, N. J.
Foxboro Co., 106 Neponset Ave., Foxboro, Mass.
Hays Corp., E. 8th St., Michigan City, Ind.
Huyette Co., Inc., Paul B., 401 N. Broad St., Philadelphia, Pa.
Leeds & Northrup Co., 4970 Stenton Ave., Philadelphia, Pa.
Minneapolis-Honeywell Regulator Co., 2701 Fourth Ave., South, Minneapolis, Minn.
Republic Flow Meters Co., 2240 Diversey Pkwy., Chicago, Ill.
Tagliabue Mfg. Co., C. J., 540 Park Ave., Brooklyn, N. Y.
Uehling Instrument Co., 473 Getty Ave., Paterson, N. J.
Weaver Mfg. Co., Springfield, Ill.

RECORDERS
Draft

Bacharach Industrial Instrument Co., 7000 Bennett St., Pittsburgh, Pa.
Bailey Meter Co., 1050 Ivanhoe Rd., Cleveland, O.
Bristol Co., Platts Bridge, Waterbury, Conn.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., 4534 Wayne Ave., Philadelphia, Pa.
Defender Automatic Regulator Co., 308 S. 8th St., St. Louis, Mo.
Foxboro Co., 106 Neponset Ave., Foxboro, Mass.
Hays Corp., E. 8th St., Michigan City, Ind.
Huyette Co., Inc., Paul B., 401 N. Broad St., Philadelphia, Pa.
Manning, Maxwell & Moore, Inc., American Schaeffer & Budenberg Instrument Div., Bridgeport, Conn.
Mason-Neilan Regulator Co., 1190 Adams St., Boston, Mass.
Republic Flow Meters Co., 2240 Diversey Pkwy., Chicago, Ill.
Uehling Instrument Co., 473 Getty Ave., Paterson, N. J.
Weaver Mfg. Co., Springfield, Ill.
Wheelco Instruments Co., 1933 S. Halsted St., Chicago, Ill.

RECORDERS
Humidity

Bristol Co., Platts Bridge, Waterbury, Conn.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., 4534 Wayne Ave., Philadelphia, Pa.
Foxboro Co., 106 Neponset Ave., Foxboro, Mass.
Friez & Sons, Julien P., 4 N. Central Ave., Baltimore, Md.
H-B Instrument Co., 2518 N. Broad St., Philadelphia, Pa.
Leeds & Northrup Co., 4970 Stenton Ave., Philadelphia, Pa.
Manning, Maxwell & Moore, Inc., American Schaeffer & Budenberg Instrument Div., 11 Elias St., Bridgeport, Conn.
Mason-Neilan Regulator Co., 1190 Adams St., Boston, Mass.
Minneapolis-Honeywell Regulator Co., 2701 Fourth Ave., South, Minneapolis, Minn.
Moeller Instrument Co., 132nd St. & 89th Ave., Richmond Hill, N. Y.
Powers Regulator Co., 2720 Greenview Ave., Chicago, Ill.
Scientific Instrument Co., 531-35 W. Larned, Detroit, Mich.
Tagliabue Mfg. Co., C. J., 540 Park Ave., Brooklyn, N. Y.
Taylor Instrument Companies, 95 Ames St., Rochester, N. Y.
Trerice Co., H. O., 1420 W. Lafayette Blvd., Detroit, Mich.
Weaver Mfg. Co., Springfield, Ill.
Wheelco Instruments Co., 1933 S. Halsted St., Chicago, Ill.

RECORDERS
Temperature

Bacharach Industrial Instrument Co., 7000 Bennett St., Pittsburgh, Pa.
Bailey Meter Co., 1050 Ivanhoe Rd., Cleveland, O.
Bristol Co., Platts Bridge, Waterbury, Conn.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., 4534 Wayne Ave., Philadelphia, Pa.
Builders Iron Foundry, 9 Codding St., Providence, R. I.
Defender Automatic Regulator Co., 308 S. 8th St., St. Louis, Mo.
Electric Auto-Lite Co., Moto Meter Gauge & Equipment Div., Caledonia & Gillette Sts., La Crosse, Wis.
Engelhard, Inc., Charles, 90 Chestnut St., Newark, N. J.
Foxboro Co., 106 Neponset Ave., Foxboro, Mass.
Friez & Sons, Julien P., 4 N. Central Ave., Baltimore, Md.
H-B Instrument Co., 2518 N. Broad St., Philadelphia, Pa.
Leeds & Northrup Co., 4970 Stenton Ave., Philadelphia, Pa.
Manning, Maxwell & Moore, Inc., American Schaeffer & Budenberg Instrument Div., 11 Elias St., Bridgeport, Conn.
Marsh, Corp., Jas. P., 2089 Southport Ave., Chicago, Ill.
Mason-Neilan Regulator Co., 1190 Adams St., Boston, Mass.
Minneapolis-Honeywell Regulator Co., 2701 Fourth Ave., South, Minneapolis, Minn.
Moeller Instrument Co., 132nd St. & 89th Ave., Richmond Hill, N. Y.
Palmer Co., 2501 Norwood Ave., Cincinnati (Norwood). O.
Powers Regulator Co., 2720 Greenview Ave., Chicago, Ill.
Practical Instrument Co., 2717 N. Ashland Ave., Chicago, Ill.
Pyrometer Instrument Co., 103 Lafayette St., New York, N. Y.
Republic Flow Meters Co., 2240 Diversey Pkwy., Chicago, Ill.
Sarco Co., Inc., 183 Madison Ave., New York, N. Y.
Scientific Instrument Co., 531-35 W. Larned, Detroit, Mich.
Standard Thermometer, Inc., 65 Shirley St., Boston, Mass.
Tagliabue Mfg. Co., C. J., 540 Park Ave., Brooklyn, N. Y.
Taylor-Instrument Companies, 95 Ames St., Rochester, N. Y.
Thwing-Albert Instrument Co., 3339 Lancaster Ave., Philadelphia, Pa.
Trerice Co., H. O., 1420 W. Lafayette Blvd., Detroit, Mich.
Weaver Mfg. Co., Springfield, Ill.
Wheelco Instruments Co., 1933 S. Halsted St., Chicago, Ill.

RECORDERS
Temperature and Humidity

Bristol Co., Platts Bridge, Waterbury, Conn.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., 4534 Wayne Ave., Philadelphia, Pa.
Foxboro Co., 106 Neponset Ave., Foxboro, Mass.
Friez & Sons, Julien P., 4 N. Central Ave., Baltimore, Md.
Leeds & Northrup Co., 4970 Stenton Ave., Philadelphia, Pa.
Manning, Maxwell & Moore, Inc., American Schaeffer & Budenberg Instrument Div., 11 Elias St., Bridgeport, Conn.
Mason-Neilan Regulator Co., 1190 Adams St., Boston, Mass.
Minneapolis-Honeywell Regulator Co., 2701 Fourth Ave., South, Minneapolis, Minn.
Moeller Instrument Co., 132nd St. & 89th Ave., Richmond Hill, N. Y.
Powers Regulator Co., 2720 Greenview Ave., Chicago, Ill.
Scientific Instrument Co., 531-35 W. Larned, Detroit, Mich.
Tagliabue Mfg. Co., C. J., 540 Park Ave., Brooklyn, N. Y.
Taylor Instrument Companies, 95 Ames St., Rochester, N. Y.

Trerice Co., H. O., 1420 W. Lafayette Blvd., Detroit, Mich.
Weaver Mfg. Co., Springfield, Ill.
Wheelco Instruments Co., 1933 S. Halsted St., Chicago, Ill.

RECORDERS

Vacuum and Pressure

Ashton Valve Co., 161—1st St., Cambridge, Mass.
Bacharach Industrial Instrument Co., 7000 Bennett St., Pittsburgh, Pa.
Bailey Meter Co., 1050 Ivanhoe Rd., Cleveland, O.
Bristol Co., Platts Bridge, Waterbury, Conn.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., 4534 Wayne Ave., Philadelphia, Pa.
Defender Automatic Regulator Co., 308 S. 8th St., St. Louis, Mo.
Electric Auto-Lite Co., Moto Meter Gauge & Equipment Div. Caledonia & Gillette Sts., La Crosse, Wis.
Foxboro Co., 106 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4970 Stenton Ave., Philadelphia, Pa.
Manning, Maxwell & Moore, Inc., American Schaeffer & Budenberg Instrument Div., 11 Elias St., Bridgeport, Conn.
Marsh, Corp., Jas. P., 2089 Southport Ave., Chicago, Ill.
Mason-Neilan Regulator Co., Boston, Mass.
Moeller Instrument Co., 132nd St. & 89th Ave., Richmond Hill, N. Y.
Republic Flow Meters Co., 2240 Diversey Pkwy., Chicago, Ill.
Scientific Instrument Co., 531-35 W. Larned, Detroit, Mich.
Tagliabue Mfg. Co., C. J., 540 Park Ave., Brooklyn, N. Y.
Taylor Instrument Companies, 95 Ames St., Rochester, N. Y.
Trerice Co., H. O., 1420 W. Lafayette Blvd., Detroit, Mich.
Uehling Instrument Co., 473 Getty Ave., Paterson, N. J.
United States Gauge Co., 44 Beaver St., New York, N. Y.
Weaver Mfg. Co., Springfield, Ill.
Wheelco Instruments Co., 1933 S. Halsted St., Chicago, Ill.

REDUCERS, SPEED

Adams Co., The, E. 4th St., Dubuque, Ia.
Allis-Chalmers Mfg. Co., 1126 S. 70th St., Milwaukee, Wis.
Boston Gear Wks., Inc., North Quincy, Mass.
De Laval Steam Turbine Co., 300 Nottingham Way, Trenton, N. J.
General Electric Co., 1 River Rd., Schenectady, N. Y.
Ideal Commutator Dresser Co., 4169 Park Ave., Sycamore, Ill.
Janette Mfg. Co., 556 W. Monroe St., Chicago, Ill.
Jones Foundry & Machine Co., W. A., 4401 Roosevelt Rd., Chicago, Ill.
Link-Belt Co., 2045 W. Huntington Park Ave., Philadelphia, Pa.
Medart Co., 3500 DeKalb St., St. Louis, Mo.
Moore Steam Turbine Div., Worthington Pump & Machinery Corp., Harrison, N. J.
Morse Chain Co., Turner Pl., Ithaca, N. Y.
Philadelphia Gear Co., Erie Ave. & G St., Philadelphia, Pa.
Poole Foundry & Machine Co., 1700 Union Ave., Woodberry, Baltimore, Md.
Smith, Inc., Winfield H., Eaton St., Springville, N. Y.
Star Electric Motor Co., 197 Grove St., Bloomfield, N. J.
Stephens-Adamson Mfg. Co., Aurora, Ill.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

REFRACTORY CEMENT

(See Cement, Refractory)

REFRACTORIES

Aluminum Co. of America, 801 Gulf Bldg., Pittsburgh, Pa.
Armstrong Cork Co., 994 Concord St., Lancaster, Pa.
Atlas Asbestos Co., Ltd., 110 McGill St., Montreal, Que., Canada.
Babcock & Wilcox Co., 85 Liberty St., New York, N. Y.
Botfield Refractories Co., 776-82 S. Swanson St., Philadelphia, Pa.
Carborundum Co., Dept. P., Perth Amboy, N. J.
Carolina Refractories Co., Hartsville, S. C.
Chapman Clay Co., Zanesville, O.
Chicago Fire Brick Co., 1467 N. Elston Ave., Chicago, Ill.
Dee Material Co., Wm. E., 105 W. Monroe St., Chicago, Ill.
Denver Fire Clay Co., 2301 Blake St., Denver, Colo.
Fireline Stove & Furnace Lining Co., 1800 Kingsbury St., Chicago, Ill.
Gilbert & Son, Harry E., 11 Brooklawn Terrace, Bridgeport, Conn.
Johns-Manville, 22 E. 40th St., New York, N. Y.
Keasbey & Mattison Co., Butler Ave., Ambler, Pa.
Krehbiel Co., J. H., 425 N. Crawford Ave., Chicago, Ill.
Laclede-Christy Clay Products Co., 411 N. Seventh St., St. Louis, Mo.
McLeod & Henry Co., Inc., Troy, N. Y.
Mexico Refractories Co., Mexico, Mo.
Munn and Steele, Inc., 130 Lister Ave., Newark, N. J.
Norton Co., Worcester, Mass.
Plibrico Jointless Firebrick Co., 1800 Kingsbury St., Chicago, Ill.
Preferred Utilities Mfg. Corp., 33 W. 60th St., New York, N. Y.
Pyrolite Products Co., 1221-31 W. 74th St., Cleveland, O.
Quigley Co., Inc., 56 W. 45th St., New York, N. Y.
Refractory & Insulation Corp., 381 Fourth Ave., New York, N. Y.
Rex Clay Products Co., 14414 Dexter Blvd., Detroit, Mich.
Ruberoid Co., The, 500 Fifth Ave., New York, N. Y.
Schundler & Co., Inc., F. E., Insulation Div., 504 Railroad St., Joliet, Ill.
Standard Fuel Engineering Co., 667 Post Ave., South, Detroit, Mich.
Walsh Refractories Corp., 4430 N. First St., St. Louis, Mo.

REFRIGERANT LEAK DETECTORS

(See Detectors, Leak)

REFRIGERANT CONDENSERS

(See Condensers, Refrigerant)

REFRIGERANT FLOW METERS

(See Meters, Refrigerant Flow)

REFRIGERANTS

Ansul Chemical Co., Marinette, Wis.
Armour Ammonia Wks., 1355 W. 31st St., Chicago, Ill.
Baker Ice Machine Co., Inc., 1508 Evans St., Omaha, Neb.
Carbide & Carbon Chemicals Corp., 30 E. 42nd St., New York, N. Y.
du Pont de Nemours & Co., Inc., E. I., The, R. & H. Chemicals Dept., Wilmington, Del.
du Pont de Nemours & Co., National Ammonia Div., Frankford, Philadelphia, Pa.
Kinetic Chemicals, Inc., 10th & Market St., Wilmington, Del.
Liquid Carbonic Corp., 3100 S. Kedzie Ave., Chicago, Ill.
Pennsylvania Salt Mfg. Co., 1335 Chestnut St., Philadelphia, Pa.
Pure Carbonic, Inc., Lincoln Bldg., New York, N. Y.
Solvay Sales Corp., 42 Rector St., New York, N. Y.
Virginia Smelting Co., West Norfolk, Va.

REFRIGERATION COMPRESSORS

(See Compressors, Refrigeration)

REFRIGERATION FITTINGS

(See Fittings, Refrigeration)

REFRIGERATION VALVES

(See Valves, Refrigeration)

REGISTERS

(See also Grilles, and Diffusers, Air)

Acme Tin Plate & Roofing Supply Co., 3rd & Westmorerland Sts., Philadelphia, Pa.
Air Control Products, Inc., Glades St. and Larch, Muskegon, Mich.
Air Devices, Inc., 17 E. 42nd St., New York, N. Y.
American Foundry & Furnace Co., Washington St. at McClun, Bloomington, Ill.
Anemostat Corp. of America, 10 E. 39th St., New York, N. Y.
Auer Register Co., 3609 Payne Ave., Cleveland, O.
Barber-Colman Co., 225 Loomis St., Rockford, Ill.
Best Register Co., 2005 W. Oklahoma Ave., Milwaukee, Wis.
Char-Gale Mfg. Co., 3127 Hiawatha Ave., Minneapolis, Minn.
Diamond Mfg. Co., 253 W. Eighth St., Wyoming, Pa.
Elsey Metal Specialties Co., 1535 Spruce St., Detroit, Mich.
Gillian Mfg. Co., 7752 Dubois St., Detroit, Mich.
Hart & Cooley Mfg. Co., Holland, Mich.
Hendrick Mfg. Co., 37 Dundaff St., Carbondale, Pa.
Independent Register Co., 3747 E. 93rd St., Cleveland, O.
Knowles Mushroom Ventilator Co., 11 Label St., Montclair, N. J.
Lamneck Products, Inc., 905 Cremo St., Middletown, O.
Middleton Mfg. & Sales Co., 125 N. First St., Minneapolis, Minn.
Mueller Furnace Co., L. J., 2005 W. Oklahoma Ave., Milwaukee, Wis.
Newman Bros., Inc., 666 W. Fourth St., Cincinnati, O.
Pacific Gas Radiator Co., Roseberry and Walter Sts., Huntington Park, Cal.
Register & Grille Mfg. Co., 70 Berry St., Brooklyn, N. Y.
Richmond Radiator Co., Gas Products Div., Uniontown, Pa.
Roberts-Hamilton Co., 707-715 S. Third St., Minneapolis, Minn.
Rock Island Register Co., 2435 Fifth Ave., Rock Island, Ill.
Standard Stamping & Perforating Co., 3131 W. 49th Pl., Chicago, Ill.
Tuttle & Bailey, Inc., Corbin Ave., New Britain, Conn.
U. S. Air Conditioning Corp., 2101 Kennedy St., N. E., Minneapolis, Minn.
United States Register Co., Burnham St., Battle Creek, Mich.
Waterloo Register Co., 600 Anita St., Waterloo, Ia.

REGULATORS

Air Pressure

American Meter Co., Inc., 60 E. 42nd St., New York, N. Y.
Askania Regulator Co., 1605 S. Michigan Ave., Chicago, Ill.
Belfield Co., H., 435 N. Broad St., Philadelphia, Pa.
Boylston Steam Specialty Co., 116-122 W. Illinois St., Chicago, Ill.
Brooke Engineering Co., Inc., 4517 Wayne Ave., Philadelphia, Pa.
Cash Universal Regulator Co., Marshalltown, Ia.
Central Brass Mfg. Co., 2950 E. 55th St., Cleveland, O.
Cooper Co., Clark, 159 Jefferson St., Philadelphia, Pa.
Davis Regulator Co., 2546 S. Washtenaw Ave., Chicago, Ill.
Defender Automatic Regulator Co., 308 S. 8th St., St. Louis, Mo.
DeVilbiss Co., The, 300 Phillips Ave., Toledo, O.
Dockson Corporation, 3847 Wabash Ave., Detroit, Mich.
Fisher Governor Co., 201 S. First St., Marshalltown, Ia.
Friez & Sons, Julien P., 4 N. Central Ave., Baltimore, Md.
Foster Engineering Co., 109 Monroe St., Newark, N. J.
General Controls Co., 700 W. Ivy St., Glendale, Cal.
Grove Regulator Co., 1729 Poplar St., Oakland, Cal.
Illinois Engineering Co., 2035 S. Racine Ave., Chicago, Ill.
Keckley Co., O. C., 400 W. Madison St., Chicago, Ill.
Kieley & Mueller, Inc., 40 W. 13th St., New York, N. Y.
Klipfel Mfg. Co., 2651 W. Harrison St., Chicago, Ill.
Leslie Co., Valley Brook & Grant Aves., Lyndhurst, N. J.
Mason-Neilan Regulator Co., 1190 Adams St., Boston, Mass.
McAlear Mfg. Co., 1901-1909 S. Western Ave., Chicago, Ill.
Milburn Co., Alexander, 1426 W Baltimore St., Baltimore, Md.
Mueller Co., Decatur, Ill.
Mueller Steam Specialty Co., Inc., 40-20 22nd St., Long Island City, N. Y.
Norgren Co., Inc., C. A., 222 Santa Fe Drive, Denver, Colo.
Penn Electric Switch Co., Box 556, Goshen, Ind.
Reading-Pratt & Cady Div., American Chain & Cable Co., Inc., Reading, Pa.
Ruggles-Klingemann Mfg. Co., 4 Foster Ct., Salem, Mass.
Schade Valve Mfg. Co., 2527 N. Bodine St., Philadelphia, Pa.
Spence Engineering Co., Inc., 28 Grant St., Walden, N. Y.
Spray Engineering Co., 114 Central St., Somerville, Mass.
Square D. Co., 6060 Rivard St., Detroit, Mich.
Square D Co., 4041 N. Richards St., Milwaukee, Wis.
Tagliabue Mfg. Co., C. J., 540 Park Ave., Brooklyn, N. Y.
Taylor Instrument Companies, 95 Ames St., Rochester, N. Y.
Trerice Co., H. O., 1420 W. Lafayette Blvd., Detroit, Mich.
Tryco Products, Inc., Railroad Squ., Westfield, Mass.
Watson & McDaniel Co., 440 N. Marshall, Philadelphia, Pa.
White-Rodgers Electric Co., 1289 Cass Ave., St. Louis, Mo.

REGULATORS

Air Pressure, Static

American Meter Co., Inc., 60 E. 42nd St., New York, N. Y.
Bristol Co., Platts Bridge, Waterbury, Conn.
Johnson Service Co., 507 E. Michigan St., Milwaukee, Wis.
Minneapolis-Honeywell Regulator Co., 2701 Fourth Ave., South, Minneapolis, Minn.
Powers Regulator Co., 2720 Greenview Ave., Chicago, Ill.
Spence Engineering Co., Inc., 28 Grant St., Walden, N. Y.

REGULATORS

Air Velocity

Air Devices, Inc., 17 E. 42nd St., New York, N. Y.
Anemostat Corp. of America, 10 E. 39th St., New York, N. Y.
Johnson Service Co., 507 E. Michigan St., Milwaukee, Wis.
Powers Regulator Co., 2720 Greenview Ave., Chicago, Ill.
Young Regulator Co., 4500 Euclid St., Cleveland, O.

REGULATORS

Draft

American Radiator & Standard Sanitary Corp., Bessemer Bldg., Pittsburgh, Pa.
Askania Regulator Co., 1605 S. Michigan Ave., Chicago, Ill.
Au-Temp-Co Corp., 1 Park Ave., New York, N. Y.
Automatic Products Co., 2450 N. 32nd St., Milwaukee, Wis.
Bailey Meter Co., 1050 Ivanhoe Rd., Cleveland, O.

Boiler Room Equipment, Inc., 45 W. 45th St., New York, N. Y.
Bristol Co., Platts Bridge, Waterberry, Conn.
Brooke Engineering Co., Inc., 4517 Wayne Ave., Philadelphia, Pa.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., 4534 Wayne Ave., Philadelphia, Pa.
Burrows Mfg. Co., F. A., 1638 E. Market St., York, Pa.
Cash Co., A. W., Decatur, Ill.
Cole-Sullivan Engineering Co., 1316 Third St., N., Minneapolis, Minn.
Crew-Equipment Co., Inc., 101 Park Ave., New York, N. Y.
Davis Regulator Co., 2546 S. Washtenaw Ave., Chicago, Ill.
Defender Automatic Regulator Co., 308 S. 8th St., St. Louis, Mo.
Engineer Co., 17 Battery Pl., New York, N. Y.
Field Mfg. Co., 2328 Nelson St., Chicago, Ill.
Foster Engineering Co., 109 Monroe St., Newark, N. J.
Foster Wheeler Corp., 165 Broadway, New York, N. Y.
Foxboro Co., 106 Neponset Ave., Foxboro, Mass.
Gilbert & Barker Mfg. Co., Springfield, Mass.
Gleason-Avery, Inc., 27 Clark St., Auburn, N. Y.
Hagan Corp., 600 Bowman Bldg., Pittsburgh, Pa.
Hays Corp., E. 8th St., Michigan City, Ind.
Huyette Co., Inc., Paul B., 401 N. Broad St., Philadelphia, Pa.
Illinois Engineering Co., 2035 S. Racine Ave., Chicago, Ill.
Kieley & Mueller, Inc., 40 W. 13th St., New York, N. Y.
Leeds & Northrup Co., 4970 Stenton Ave., Philadelphia, Pa.
Locke Regulator Co., 76 North St., Salem, Mass.
Mason-Neilan Regulator Co., 1190 Adams St., Boston, Mass.
National Brass Co., 1603 Madison Ave., Grand Rapids, Mich.
Natural Gas Equipment Incorporated, 539 Petroleum Bldg., Los Angeles, Cal.
Parker-Kalon Corp., 200 Varick St., New York, N. Y.
Perfex Corp. (Controls Div.), 500 W. Oklahoma Ave., Milwaukee, Wis.
Pioneer Heat Regulator Div., Master Electric Co., The, 100 Davis Ave., Milwaukee, Wis.
Preferred Utilities Mfg. Corp., 33 W. 60th St., New York, N. Y.
Republic Flow Meters Co., 2240 Diversey Pkwy., Chicago, Ill.
Ruggles-Klingemann Mfg. Co., 4 Foster Ct., Salem, Mass.
Russell Electric Co., 348 W. Huron St., Chicago, Ill.
Sarco Co., Inc., 183 Madison Ave., New York, N. Y.
Shallcross Controls, Inc., 121 N. Broadway, Milwaukee, Wis.
Sheer Co., H. M., Second & Hampshire Sts., Quincy, Ill.
Spence Engineering Co., Inc., 28 Grant St., Walden, N. Y.
Tagliabue Mfg. Co., C. J., 540 Park Ave., Brooklyn, N. Y.

REGULATORS
Gas Pressure

American Meter Co., Inc., 60 E. 42nd St., New York, N. Y.
Askania Regulator Co., 1605 S. Michigan Ave., Chicago, Ill.
Atlas Valve Co., Inc., 282 South St., Newark, N. J.
Barber Gas Burner Co., 3704 Superior Ave., Cleveland, O.
Belfield Co., H., 435 N. Broad St., Philadelphia, Pa.
Boylston Steam Specialty Co., 116-122 W. Illinois St., Chicago, Ill.
Bristol Co., Platts Bridge, Waterbury, Conn.
Brooke Engineering Co., Inc., 4517 Wayne Ave., Philadelphia, Pa.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., 4534 Wayne Ave., Philadelphia, Pa.
Burdett Mfg. Co., 19 N. Loomis St., Chicago, Ill.
Cash Co., A. W., Decatur, Ill.
Chaplin-Fulton Mfg. Co., 28-40 Penn Ave., Pittsburgh, Pa.
Cooper Co., Clark, 159 Jefferson St., Philadelphia, Pa.
Davis Regulator Co., 2546 S. Washtenaw Ave., Chicago, Ill.
Defender Automatic Regulator Co., 308 S. 8th St., St. Louis, Mo.
Dockson Corporation, 3847 Wabash Ave., Detroit, Mich.
Eclipse Fuel Engineering Co., 707 S. Main St., Rockford, Ill.
Fisher Governor Co., 201 S. First Ave., Marshalltown, Ia.
Foster Engineering Co., 109 Monroe St., Newark, N. J.
Foxboro Co., 106 Neponset Ave., Foxboro, Mass.
Friez & Sons, Julien P., 4 N. Central Ave., Baltimore, Md.
General Controls Co., 700 W. Ivy St., Glendale, Cal.
Grove Regulator Co., 1729 Poplar St., Oakland, Cal.
Harris Calorific Co., The, 5501 Cass Ave., N. W., Cleveland, O.
Illinois Engineering Co., 2035 S. Racine Ave., Chicago, Ill.
Imperial Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.
Kieley & Mueller, Inc., 34 W. 13th St., New York, N. Y.
Klipfel Mfg. Co., 2651 W. Harrison St., Chicago, Ill.
Leslie Co., Valley Brook & Grant Aves., Lyndhurst, N. J.
Mason-Neilan Regulator Co., 1190 Adams St., Boston, Mass.
McAlear Mfg. Co., 1901-1909 S. Western Ave., Chicago, Ill.
Milburn Co., Alexander, 1426 W. Baltimore St., Baltimore, Md.
Monitor Controller Co., 51 S. Gay St., Baltimore, Md.
Mueller Co., Decatur, Ill.
Mueller Steam Specialty Co., Inc., 40-20 22nd St., Long Island City, N. Y.
Natural Gas Equipment Incorporated, 539 Petroleum Bldg., Los Angeles, Cal.
Norgren Co., Inc., C. A., 222 Santa Fe Dr., Denver, Colo.
Pacific Gas Radiator Co., Roseberry & Walter Sts., Huntington Park, Cal.
Pittsburgh Equitable Meter Co., 400 N. Lexington Ave., Pittsburgh, Pa.
Powers Regulator Co., 2720 Greenview Ave., Chicago, Ill.
Reading-Pratt & Cady Div., American Chain & Cable Co., Inc., Reading, Pa.
Republic Flow Meters Co., 2240 Diversey Pkwy., Chicago, Ill.
Ruggles-Klingemann Mfg. Co., 4 Foster Ct., Salem, Mass.
Schade Valve Mfg. Co., 2527 N. Bodine St., Philadelphia, Pa.
Shallcross Controls, Inc., 121 N. Broadway, Milwaukee, Wis.
Sheer Co., H. M., Second & Hampshire Sts., Quincy, Ill.
Spence Engineering Co., Inc., 28 Grant St., Walden, N. Y.
Square D Co., 6060 Rivard St., Detroit, Mich.
Staples & Pfeiffer, Ltd., 528 Bryant St., San Francisco, Cal.
Strong, Carlisle & Hammond Co., The, 1392 W. Third St., Cleveland, O.
Tagliabue Mfg. Co., C. J., 540 Park Ave., Brooklyn, N. Y.
Taylor Instrument Companies, 95 Ames St., Rochester, N. Y.
Trerice Co., H. O., 1420 W. Lafayette Blvd., Detroit, Mich.
Watson & McDaniel Co., 440 N. Marshall, Philadelphia, Pa.

REGULATORS, Humidity

(See Controls, Humidity)

REGULATORS
Liquid Pressure

Atlas Valve Co., Inc., 282 South St., Newark, N. J.
Automatic Control Co., 1005 University Ave., St. Paul, Minn.
Belfield Co., H., 435 N. Broad St., Philadelphia, Pa.
Boylston Steam Specialty Co., 116-122 W. Illinois St., Chicago, Ill.
Bristol Co., Platts Bridge, Waterbury, Conn.
Brooke Engineering Co., Inc., 4517 Wayne Ave., Philadelphia, Pa.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., 4534 Wayne Ave., Philadelphia, Pa.
Cash Co., A. W., Decatur, Ill.
Cash Universal Regulator Co., Marshalltown, Ia.
Chaplin-Fulton Mfg. Co., 28-40 Penn Ave., Pittsburgh, Pa.
Cooper Co., Clark, 159 Jefferson St., Philadelphia, Pa.
Davis Regulator Co., 2546 S. Washtenaw Ave., Chicago, Ill.
Defender Automatic Regulator Co., 308 S. 8th St., St. Louis, Mo.
Electrimatic Corp., 2100 Indiana Ave., Chicago, Ill.
Fisher Governor Co., 201 S. First Ave., Marshalltown, Ia.
Foster Engineering Co., 109 Monroe St., Newark, N. J.
Foxboro Co., 106 Neponset Ave., Foxboro, Mass.
Friez & Sons, Julien P., 4 N. Central Ave., Baltimore, Md.
Fulton Sylphon Co., Knoxville, Tenn.
Golden-Anderson Valve Specialty Co., Fulton Bldg., Pittsburgh, Pa.
Grove Regulator Co., 1729 Poplar St., Oakland, Cal.
Healy Ruff Co., 765 Hampden Ave., St. Paul, Minn.
Illinois Engineering Co., 2035 S. Racine Ave., Chicago, Ill.
Justus Steam Trap Co., Napanoch, N. Y.
Keckley Co., O. C., 400 W. Madison St., Chicago, Ill.
Kieley & Mueller, Inc., 40 W. 13th St., New York, N. Y.
Klipfel Mfg. Co., 2651 W. Harrison St., Chicago, Ill.
Leslie Co., Valley Brook & Grant Aves., Lyndhurst, N. J.
Locke Regulator Co., 76 North St., Salem, Mass.
Marsh, Corp., Jas. P., 2089 Southport Ave., Chicago, Ill.
Mason-Neilan Regulator Co., 1190 Adams St., Boston, Mass.
McAlear Mfg. Co., 1901-1909 S. Western Ave., Chicago, Ill.
McDonnell & Miller, 400 N. Michigan Ave., Chicago, Ill.
Minneapolis-Honeywell Regulator Co., 2701 Fourth Ave., So., Minneapolis, Minn.
Monarch Mfg. Wks., Inc., Salmon & Westmoreland Sts., Philadelphia, Pa.
Monitor Controller Co., 51 S. Gay St., Baltimore, Md.
Mueller Co., Decatur, Ill.
Mueller Steam Specialty Co., Inc., 40-20 22nd St., Long Island City, N. Y.
Natural Gas Equipment Incorporated, 539 Petroleum Bldg., Los Angeles, Cal.
Norgren Co., Inc., C. A., 222 Santa Fe Dr., Denver, Colo.
Perfex Corp. (Controls Div.), 500 W. Oklahoma Ave., Milwaukee, Wis.
Powers Regulator Co., 2720 Greenview Ave., Chicago, Ill.
Reading-Pratt & Cady Div., American Chain & Cable Co., Inc., Reading, Pa.
Republic Flow Meters Co., 2240 Diversey Pkwy., Chicago, Ill.
Ruggles-Klingemann Mfg. Co., 4 Foster Ct., Salem, Mass.
Schade Valve Mfg. Co., 2527 N. Bodine St., Philadelphia, Pa.
Schutte & Koerting Co., 12th and Thompson Sts., Philadelphia, Pa.
Scientific Instrument Co., 531-35 W. Larned, Detroit, Mich.
Shallcross Controls, Inc., 121 N. Broadway, Milwaukee, Wis.
Spence Engineering Co., Inc., 28 Grant St., Walden, N. Y.
Square D Co., 6060 Rivard St., Detroit, Mich.
Square D Co., 4041 N. Richards St., Milwaukee, Wis.
Staples & Pfeiffer, Ltd., 528 Bryant St., San Francisco, Cal.

YARWAY GUN-PAKT EXPANSION JOINT

It is packed under full steam pressure. By the turn of a wrench, integral pressure guns force a special semi-plastic packing into the stuffing box.

Welded Steel Construction. Alemite lubricated cylinder-guided sleeve. Made also in conventional gland-pakt types. Write for Bulletin EJ-1907.

YARNALL-WARING COMPANY
104 Mermaid Ave. PHILADELPHIA

One of 40—24" Yarway Gun-Pakt Expansion Joints recently purchased by a leading automobile manufacturer. Good for 300 lbs. pressure, with welding ends and welded steel base.

Stickle Steam Specialties Co., 2215 Valley Ave., Indianapolis, Ind.
Strong, Carlisle & Hammond Co., The, 1392 W. Third St., Cleveland, O.
Swartwout Co., 18511 Euclid Ave., Cleveland, O.
Tagliabue Mfg. Co., C. J., 540 Park Ave., Brooklyn, N. Y.
Taylor Instrument Companies, 95 Ames St., Rochester, N. Y.
Trerice Co., H. O., 1420 W. Lafayette Blvd., Detroit, Mich.
Tryco Products, Inc., Railroad Sq., Westfield, Mass.
United Electric Controls Co., 69A St., Boston, Mass.
Watson & McDaniel Co., 440 N. Marshall, Philadelphia, Pa.
Watts Regulator Co., 10 Embankment St., Lawrence, Mass.
White-Rodgers Electric Co., 1289 Cass Ave., St. Louis, Mo.

REGULATORS
Pressure (For Hot Water Heating Systems)

Boll & Gossett Co., 3000 Wallace St., Chicago, Ill.
Fisher Governor Co., 201 S. First Ave., Marshalltown, Ia.
Friez & Sons, Julien P., 4 N. Central Ave., Baltimore, Md.
Kainer Co., 761 W. Lexington, Chicago, Ill.
Kehm Corp., The, 441 N. La Salle St., 51 E. Grand Ave., Chicago, Ill.
Maid-O-Mist, Inc., 215 N. Aberdeen St., Chicago, Ill.
Mason-Neilan Regulator Co., 1190 Adams St., Boston, Mass.
McDonnell & Miller, 400 N. Michigan Ave., Chicago, Ill.
Minneapolis-Honeywell Regulator Co., 2701 Fourth Ave., So., Minneapolis, Minn.
Mueller Co., Decatur, Ill.
Penberthy Injector Co., 1242 Holden Ave., Detroit, Mich.
Scientific Instrument Co., 531-35 W. Larned, Detroit, Mich.
Sterling, Inc., 3738 N. Holton St., Milwaukee, Wis.
Tagliabue Mfg. Co., 540 Park Ave., Brooklyn, N. Y.
Thrush & Co., H. A., 21 E. Riverside Dr., Peru, Ind.
Watts Regulator Co., 10 Embankment St., Lawrence, Mass.
White-Rodgers Electric Co., 1289 Cass Ave., St. Louis, Mo.

REGULATORS
Steam Pressure

American District Steam Co., Bryant St., North Tonawanda, N. Y.
American Radiator & Standard Sanitary Corp., Bessemer Bldg., Pittsburgh, Pa.
Atlas Valve Co., Inc., 282 South St., Newark, N. J.
Bailey Meter Co., 1050 Ivanhoe Rd., Cleveland, O.
Belfield Co., H., 435 N. Broad St., Philadelphia, Pa.
Boylston Steam Specialty Co., 116-122 W. Illinois St., Chicago, Ill.
Bristol Co., Platts Bridge, Waterbury, Conn.
Brooke Engineering Co., Inc., 4517 Wayne Ave., Philadelphia, Pa.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., 4534 Wayne Ave., Philadelphia, Pa.
Burrows Mfg. Co., F. A., 1638 E. Market St., York, Pa.
Cash Co., A. W., Decatur, Ill.
Cash Universal Regulator Co., Marshalltown, Ia.
Chaplin-Fulton Mfg. Co., 28-40 Penn Ave., Pittsburgh, Pa.
Cooper Co., Clark, 159 Jefferson St., Philadelphia, Pa.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Davis Regulator Co., 2546 S. Washtenaw Ave., Chicago, Ill.
Defender Automatic Regulator Co., 308 S. 8th St., St. Louis, Mo.
Dunham Co., C. A., 450 E. Ohio St., Chicago, Ill.
Eclipse Fuel Engineering Co., 707 S. Main St., Rockford, Ill.
Engineer Co., 17 Battery Pl., New York, N. Y.
Fisher Governor Co., 201 S. First Ave., Marshalltown, Ia.
Foster Engineering Co., 109 Monroe St., Newark, N. J.
Foxboro Co., 106 Neponset Ave., Foxboro, Mass.
Friez & Sons, Julien P., 4 N. Central Ave., Baltimore, Md.
Fulton Sylphon Co., Knoxville, Tenn.
Gilbert & Barker Mfg. Co., Springfield, Mass.
Golden-Anerson Valve Specialty Co., Fulton Bldg., Pittsburgh, Pa.
Gorton Heating Corp., Cranford, N. J.
Grove Regulator Co., 1729 Poplar St., Oakland, Cal.
Hagan Corp., 600 Bowman Bldg., Pittsburg, Pa.
Hays Corp., E. 8th St., Michigan City, Ind.
Huyette Co., Inc., Paul B., 401 N. Broad St., Philadelphia, Pa.
Illinois Engineering Co., 2035 S. Racine Ave., Chicago, Ill.
Keckley Co., O. C., 400 W. Madison St., Chicago, Ill.
Kieley & Mueller, Inc., 40 W. 13th N. Y.
Kisco Boiler & Engineering Co., 3732 Chouteau Ave., St. Louis, Mo.
Klipfel Mfg. Co., 2651 W. Harrison St., Chicago, Ill.
Leslie Co., Valley Brook & Grant Aves., Lyndhurst, N. J.
Locke Regulator Co., 76 North St., Salem, Mass.
Manning, Maxwell & Moore, Inc., American Schaeffer Budenberg Instrument Div., 11 Elias St., Bridgeport, Conn.
Marsh, Corp., Jas. P., 2089 Southport Ave., Chicago, Ill.
Mason-Neilan Regulator Co., 1190 Adams St., Boston, Mass.
McAlear Mfg. Co., 1901-1909 S. Western Ave., Chicago, Ill.
Minneapolis-Honeywell Regulator Co., 2701 Fourth Ave., South, Minneapolis, Minn.
Monitor Controller Co., 51 S. Gay St., Baltimore, Md.
Mueller Co., Decatur, Ill.
Mueller Steam Specialty Co., Inc., 40-20 22nd St., Long Island City, N. Y.
National Brass Co., 1603 Madison Ave., Grand Rapids, Mich.
Natural Gas Equipment Incorporated, 539 Petroleum Bldg., Los Angeles, Cal.
Norgren Co., Inc., C. A., 222 Santa Fe Dr., Denver, Colo.
Perfex Corp. (Controls Div.), 500 W. Oklahoma Ave., Milwaukee, Wis.
Powers Regulator Co., 2720 Greenview Ave., Chicago, Ill.
Reading-Pratt & Cady Div., American Chain & Cable Co., Inc., Reading, Pa.
Republic Flow Meters Co., 2240 Diversey Pkwy., Chicago, Ill.
Ruggles-Klingemann Mfg. Co., 4 Foster Ct., Salem, Mass.
Schade Valve Mfg. Co., 2527 N. Bodine St., Philadelphia, Pa.
Scientific Instrument Co., 531-35 W. Larned, Detroit, Mich.
Shallcross Controls, Inc., 121 N. Broadway, Milwaukee, Wis.
Spence Engineering Co., Inc., 28 Grant St., Walden, N. Y.
Spencer Thermostat Co., 43 Forest St., Attleboro, Mass.
Squires Co., C. E., E. 40th St. & Kelley Ave., Cleveland, O.
Staples & Pfeiffer, Ltd., 528 Bryant St., San Francisco, Cal.
Stickle Steam Specialties Co., 2215 Valley Ave., Indianapolis, Ind.
Strong, Carlisle & Hammond Co., The, 1392 W. Third St., Cleveland, O.
Swartwout Co., 18511 Euclid Ave., Cleveland, O.
Tagliabue Mfg. Co., C. J., 540 Park Ave., Brooklyn, N. Y.
Taylor Instrument Companies, 95 Ames St., Rochester, N. Y.
Trerice Co., H. O., 1420 W. Lafayette Blvd., Detroit, Mich.
United Electric Controls Co., 69 A St., Boston, Mass.
Watson & McDaniel Co., 440 N. Marshall, Philadelphia, Pa.
Watts Regulator Co., 10 Embankment St., Lawrence, Mass.
Webster & Co., Warren, 17th & Federal Sts., Camden, N. J.
White-Rodgers Electric Co., 1289 Cass Ave., St. Louis, Mo.
Williams Gauge Co., 1620 Pennsylvania Ave., N. S., Pittsburgh, Pa.

REGULATORS, Temperature
(See Controls, Temperature)

RELAYS, ELECTRIC

Acme Electric Heating Co., Inc., 1217 Washington St., Boston, Mass.
Advance Electric Co., 1260 W. Second St., Los Angeles, Cal.
Allen-Bradley Co., 1335 S. First St., Milwaukee, Wis.
Arrow-Hart & Hegeman Elect. Co., 103 Hawthorn St., Hartford, Conn.
Au-Temp-Co, 1 Park Ave., New York, N. Y.
Automatic Switch Co., 41 E. 11th St., New York, N. Y.
Automatic Temperature Control Co., Inc., 22 E. Logan St., Philadelphia, Pa.
Bell & Gossett Co., 3000 Wallace St., Chicago, Ill.
Bender Warrick Corp., 131 Pierce, Birmingham, Mich.
Benjamin Electric Mfg. Co., C. & N. W. R. R. & Seeger Rd., Des Plaines, Ill.
Clark Controller Co., 1146 E. 152nd St., Cleveland, O.
Cutler-Hammer, Inc., N. 12th St. and W. St. Paul Ave., Milwaukee, Wis.
Detroit Lubricator Co., 5900 Trumbull Ave., Detroit, Mich.
Dunn, Inc., Struthers, 1332 Cherry St., Philadelphia, Pa.
Durakool, Inc., 1010 N. Main St., Elkhart, Ind.
Edison, Inc., Thos. A., Edison Electrical Controls Div., Lakeside Ave., West Orange, N. J.
Electric Controller & Mfg. Co., 2700 E. 79th St., Cleveland, O.
Friez & Sons, Julien P., 4 N. Central Ave., Baltimore, Md.
General Controls Co., 700 W. Ivy St., Glendale, Cal.
General Electric Co., 1 River Rd., Schenectady, N. Y.
Gleason-Avery, Inc., 27 Clark St., Auburn, N. Y.
Guardian Electric Mfg. Co., 1621 W. Walnut St., Chicago, Ill.
H-B Instrument Co., 2518 N. Broad St., Philadelphia, Pa.
Hart Mfg. Co., Hamilton St., Hartford, Conn.
Herske & Timmis, Inc., 33 W. 60th St., New York, N. Y.
McCorkle Co., D. H., 6th & Bancroft Way, Berkeley, Cal.
Mercoid Corp., The, 4201 Belmont Ave., Chicago, Ill.
Minneapolis-Honeywell Regulator Co., 2701 Fourth Ave., South, Minneapolis, Minn.
Monitor Controller Co., 51 S. Gay St., Baltimore, Md.
Penn Electric Switch Co., Box 556, Goshen, Ind.
Perfex Corp. (Controls Div.), 500 W. Oklahoma Ave., Milwaukee, Wis.
Precision Thermometer & Instrument Co., 1434 Brandywine St., Philadelphia, Pa.
Russell Electric Co., 348 W. Huron St., Chicago, Ill.
Sheer Co., H. M., Second & Hampshire Sts., Quincy, Ill.
Spencer Thermostat Co., 43 Forest St., Attleboro, Mass.
Square D Co., 4041 N. Richards St., Milwaukee, Wis.
Taylor Instrument Companies, 95 Ames St., Rochester, N. Y.
Triplex Heating Specialty Co., Inc., 131 E. Canal St., Peru, Ind.
Ward Leonard Electric Co., 37 South St., Mt. Vernon, N. Y.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
Weston Electrical Instrument Corp., 619 Frelinghuysen Ave., Newark, N. J.
White Mfg. Co., 2362 University Ave., St. Paul, Minn.
White-Rodgers Electric Co., 1289 Cass Ave., St. Louis, Mo.
Zenith Electric Co., 607 S. Dearborn St., Chicago, Ill.

ROOF COOLING SYSTEMS

April Showers Co., 4126 Eighth St., N. W., Washington, D. C.
Ross Sprinkler Co., 34 Roberts St., Pasadena, Cal.
Schubert-Christy Corp., Box 166, Affton Station, St. Louis, Mo.
Trane Co., The, La Crosse, Wis.

ROOF VENTILATORS
(See Ventilators, Roof)

ROOM HUMIDIFIERS
(See Humidifiers, Room Cabinet Type)

ROOM THERMOMETERS
(See Thermometers, Room Mounting)

RUBBER BELTS
(See Belting, Flat)

SCREENS, WINDOW
Sun Heat Reflecting

Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Yardley Screen & Weather Strip Co., 138 Parsons Ave., Columbus, O.

SEALING COMPOUNDS
(See Compounds, Boiler and Radiator Sealing)

SECTIONAL BOILERS
(See Boilers, Cast-Iron, Sectional)

SELF-CONTAINED AIR CONDITIONERS
(See Air Conditioners, Summer, Self-Contained)

SEPARATORS, AIR

Adams Co., R. P., 55 Chicago St., Buffalo, N. Y.
American Air Filter Co., Inc., 107 Central Ave., Louisville, Ky.
American Injector Co., 1481—14th St., Detroit, Mich.
Bowser & Co., Inc., S. F., 1302 E. Creighton Ave., Fort Wayne, Ind.
Bubar, Hudson H., 15 Park Row, New York, N. Y.
Centrifix Corp., 3029 Prospect Ave., Cleveland, O.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
De Vilbiss Co., The, 300 Phillips Ave., Toledo, O.
Hagan Corp., 600 Bowman Bldg., Pittsburgh, Pa.
Illinois Engineering Co., 2035 S. Racine Ave., Chicago, Ill.
Johnson Corp., 830 Wood St., Three Rivers, Mich.
Keckley Co., O. C., 400 W. Madison St., Chicago, Ill.
Leavitt Machine Co., East River St., Orange, Mass.
Logan Engineering Co., Lawrence & Lamon Ave., Chicago, Ill.
McAlear Mfg. Co., 1901-1909 S. Western Ave., Chicago, Ill.
Milburn Co., Alexander, 1426 W. Baltimore St., Baltimore, Md.
Nicholson & Co., W. H., 12 Oregon St., Wilkes-Barre, Pa.
Northern Blower Co., 6409 Barberton Ave., Cleveland, O.
Spencer Turbine Co., 486 New Park Ave., Hartford, Conn.
Spray Engineering Co., 114 Central St., Somerville, Mass.
Staynew Filter Corp., 25 Leighton Ave., Rochester, N. Y.
Straight Line Foundry & Machine Corp., Direct Separator Div., 218 S. Geddes St., Syracuse, N. Y.
Strong, Carlisle & Hammond Co., The, 1392 W. Third St., Cleveland, O.

Opens the Way to
BETTER PERFORMANCE---LOWER COST

STOPS MORE DUST—HOLDS MORE DUST—LOW AIR RESISTANCE

More and more manufacturers of heating and air conditioning equipment are adopting RESEARCH (Walton) AIR FILTERS as standard equipment on their products because of better performance, greater economy. The unique construction of these RESEARCH filters makes them today's leader . . . for they stop more dust—hold more dust—and yet have a low air resistance that permits a "free-flow" of air through the heating equipment. RESEARCH Filters win the approval of manufacturers, dealers and consumers alike, for they assure proper operation, easy service and lower replacement cost. Be sure to investigate this new, efficient air filter—our engineers will gladly assist in solving standard and original equipment air filter problems. Write today, direct to our home office in Madison.

RESEARCH PRODUCTS CORP., MADISON, WIS., U. S. A.

Swartwout Co., 18511 Euclid Ave., Cleveland, O.
Textite Corp., 2110 Roscoe St., Chicago, Ill.
Trerice Co., H. O., 1420 W. Lafayette Blvd., Detroit, Mich.
Wright-Austin Co., 315 W. Woodbridge St., Detroit, Mich.

SEPARATORS, DUST

American Air Filter Co., Inc., 107 Central Ave., Louisville, Ky.
Bayley Blower Co., 1817 S. 66th St., Milwaukee, Wis.
Belanger Fan & Blower Co., 1230 18th St., Detroit, Mich.
Bros Boiler & Mfg. Co., Wm., Nicollet Island, Minneapolis, Minn.
Buffalo Forge Co., 171 Mortimer St., Buffalo, N. Y.
Chicago Metal Mfg. Co., 3724 S. Rockwell St., Chicago, Ill.
Clarage Fan Co., Porter St., Kalamazoo, Mich.
Day Co., The, 2938 Pillsbury Ave., Minneapolis, Minn.
Dixie Mfg. Co., Inc., Russell St., & B. & O. R. R., Baltimore, Md.
Dracco Corp., 4057 E. 116th St., Cleveland, O.
Garden City Fan Co., 332 S. Michigan Ave., Chicago, Ill.
Goethel Sheet Metal Works, Alfred, 1910 N. Killian Pl., Milwaukee, Wis.
Goethel Co., Alfred C., 2337 N. 31st St., Milwaukee, Wis.
Grand Rapids Blow Pipe & Dust Arrester Co., 525-28 Monroe Ave., Grand Rapids, Mich.
Industrial Sheet Metal Works, Inc., 628 E. Forest Ave., Detroit, Mich.
Kirk & Blum Mfg. Co., 2838-52 Spring Grove Ave., Cincinnati, O.
Lee & Son Co., Thomas, 128-132 W. Second St., Cincinnati, O.
Mellish & Murray Co., 1715 Carroll Ave., Chicago, Ill.
Northern Blower Co., 6409 Barberton Ave., Cleveland, O.
Pangborn Corp., Pangborn Blvd., Hagerstown, Md.
Puhl & Hepper Mfg. Co., Inc., 6400 W. Florissant Ave., St. Louis, Mo.
Sly Mfg. Co., W. W., 4700 Train Ave., Cleveland, O.
Spencer Turbine Co., 486 New Park Ave., Hartford, Conn.
Strandwitz & Co., Inc., N. J., Jefferson and Masters Sts., Camden, N. J.
Sturtevant Co., B. F., Damon St., Hyde Park, Boston, Mass.
Young & Bertke Co., 1004-1014 Hulbert Ave., Cincinnati, O.

SEPARATORS, STEAM

American District Steam Co., Bryant St., North Tonawanda, N. Y.
Andale Co., 1600 Arch St., Philadelphia, Pa.
Bros Boiler & Mfg. Co., Wm., Nicollet Island, Minneapolis, Minn.
Centrifix Corp., 3031 Prospect Ave., Cleveland, O.
Cochrane Corp., 3121 N. 17th St., Philadelphia, Pa.
Dri-Steam Valve Sales Corp., 70 E. 45th St., New York, N. Y.
Elliott Co., Jeannette, Pa.
Fisher Governor Co., 201 S. First Ave., Marshalltown, Ia.
Hagan Corp., Bowman Bldg., Pittsburgh, Pa.
Hoppes Mfg. Co., 850 N. Belmont Ave., Springfield, O.
Illinois Engineering Co., 2035 S. Racine Ave., Chicago, Ill.
International Filter Co., 325 W. 25th Place, Chicago, Ill.
Johnson Corp., 830 Wood St., Three Rivers, Mich.
Kellogg, M. W., Co., The, Jersey City, N. J.
Kieley & Mueller, Inc., 40 W. 13th St., New York, N. Y.
Limbert, Geo. B., & Co., 563 Fulton St., Chicago, Ill.
Marley C., Fairfax & Marley Roads, Kansas City, Kans.
Milwaukee Steam Appliance Co., 1819 S. 71st St., West Allis, Wis.
Morehead Mfg. Co., Grand River at Warren Ave., Detroit, Mich.
Murray Iron Works Company, 1106 Washington St., Burlington, Ia.
National Valve & Mfg. Co., 3101 Liberty Ave., Pittsburgh, Pa.
Nicholson, W. H., & Co., 134 Oregon St., Wilkes-Barre, Pa.
Plouff Co., 1152 Columbus Ave., Boston, Mass.
Power Plant Specialty Co., 440 S. Dearborn St., Chicago, Ill.
Seamless Steel Equipment Corp., 39 Broadway, New York, N. Y.
Schutte & Koerting Co., 1165 Thompson St., Philadelphia, Pa.
Sims Co., P. O. Box 1096, Erie, Pa.
Steamaire Co., Cincinnati, O.
Stickle Steam Specialties Co., 2215 Valley Ave., Indianapolis, Ind.
Straight Line Foundry & Machine Corp., Direct Separator Div., 218 S. Geddes St., Syracuse, N. Y.
Strong, Carlisle & Hammond Co., 1392 W. Third St., Cleveland, O.
Sullivan Valve & Engineering Co., 910 S. Arizona St., Butte, Mont.
Swartwout Co., 18537 Euclid Ave., Cleveland, O.
Webster & Co., Warren, 17th & Federal Sts., Camden, N. J.
Wright-Austin Co., 315 W. Woodbridge St., Detroit, Mich.

SHEETS, ALUMINUM

Aluminum Co. of America, 801 Gulf Bldg., Pittsburgh, Pa.
American Nickeloid Co., 113 Second St., Peru, Ill.
Fairmont Aluminum Co., Fairmont, W. Va.

SHEETS, CLAD

Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
Aluminum Co. of America, 801 Gulf Bldg., Pittsburgh, Pa.
American Brass Co., 414 Meadow St., Waterbury, Conn.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
International Nickel Co., 67 Wall St., New York, N. Y.
Jessop Steel Co., Washington, Pa.
Lukens Steel Co., 308 S. First Ave., Coatesville, Pa.
Wheeling Metal & Mfg. Co., Box 56, Wheeling, W. Va.

SHEETS, COPPER

American Brass Co., 414 Meadow St., Waterbury, Conn.
Bethlehem Steel Co., Bethlehem, Pa.
Bridgeport Brass Co., E. Main St., Bridgeport, Conn.
Chase Brass & Copper Co., 236 Grand St., Waterbury, Conn.
Fingles Co., The, Reistertown Rd. at Elgin Ave., Baltimore, Md.
Hussey & Co., C. G., 2850 Second Ave., Pittsburgh, Pa.
Milcor Steel Co., S. 41st & Burnham Sts., Milwaukee, Wis.
National Brass & Copper Co., Inc., 518 Grant Bldg., Lisbon, O.
New Haven Copper Co., Seymour, Conn.
Revere Copper and Brass Incorporated, 230 Park Ave., New York, N. Y.
United States Brass & Copper Co., Hyde Park Ave., Hyde Park, Boston, Mass.

SHEETS, STEEL

Copper-Bearing (C), Galvanized (G), Galvannealed (GA)

American Rolling Mill Co., The, 703 Curtis St., Middletown, O. (C) (G)
Apollo Steel Co., 609-617 Warren Ave., Apollo, Pa. (C) (G)
Berger Mfg. Div. Republic Steel Corp., 1038 Belden Ave., N. E., Canton, O. (C) (G)
Bethlehem Steel Co., Bethlehem, Pa. (C)
Carnegie-Illinois Steel Corp., Carnegie Bldg., Pittsburgh, Pa. (C) (G)
Columbia Steel Co., United States Steel Corp. Sub., 235 Montgomery St., San Francisco, Cal. (C) (G)
Continental Steel Corp., 1108 S. Main St., Kokomo, Ind. (C) (G)
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y. (G)
Empire Sheet & Tin Plate Co., N. Bowman St., Mansfield, O. (G)
Follansbee Bros. Co., 3rd & Liberty Aves., Pittsburgh, Pa. (C)
Granite City Steel Co., 20th & Madison Ave., Granite City, Ill. (C) (G)
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill. (C) (G)
Jones & Laughlin Steel Corp., Third & Ross St., Pittsburgh, Pa. (C) (G)
Lukens Steel Co., 308 S. First Ave., Coatesville, Pa. (C) (G)
Lyon, Conklin & Co., Inc., McComas & Race Sts., Baltimore, Md. (G)
Milcor Steel Co., S. 41st & Burnham Sts., Milwaukee, Wis.
National Steel Corp., Grant Bldg., Pittsburgh, Pa. (C) (G)
Newport Rolling Mill Co., Div. of The Andrews Steel Co., Ninth & Lowell Sts., Newport, Ky. (C) (G)
Niles Rolling Mill Co., Niles, O. (G)
Otis Steel Co., 3341 Jennings Rd., Cleveland, O. (C) (G)
Parkersburg Iron & Steel Co., Parkersburg, W. Va. (G)
Reeves Steel & Mfg. Co., Iron Ave., Dover, O. (C) (G)
Republic Steel Corp., Republic Bldg., Cleveland, O. (C) (G)
Ryerson & Son, Inc., Jos. T., 2558 W. 16th St., Chicago, Ill.
Sharon Steel Corp., Sharon, Pa. (C) (G)
Superior Sheet Steel Co., The, Division of Continental Steel Corp., Canton-Louisville Rd., Canton, O. (C) (G)
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala. (C) (G)
United States Steel Corp., 436 Seventh Ave., Pittsburgh, Pa.
Weirton Steel Co., Weirton, W. Va. (C) (G)
Wheeling Corrugating Co., Wheeling Steel Bldg., Wheeling, W. Va. (C) (G)
Wheeling Metal & Mfg. Co., Box 56, Wheeling, W. Va.
Wheeling Steel Corp., Wheeling Steel Corp. Bldg., Wheeling, W. Va. (C) (G)
Youngstown Sheet & Tube Co., 602 Stambaugh Bldg., Youngstown, O. (C) (G)

SHEETS, STEEL STAINLESS

Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 703 Curtis St., Middletown, O.
Barium Stainless Steel Corp., 1502 Allen Ave., S. E., Canton, O.
Berger Mfg. Div., Republic Steel Corp., 1038 Belden Ave., Canton, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Carnegie Bldg., Pittsburgh, Pa.
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.
Fingles Co., The, Reistertown Rd. at Elgin Ave., Baltimore, Md.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
International Nickel Co., 67 Wall St., New York, N. Y.
Jessop Steel Co., Washington, Pa.
Lukens Steel Co., 308 S. First Ave., Coatesville, Pa.
Milcor Steel Co., S. 41st & Burnham Sts., Milwaukee, Wis.
Republic Steel Corp., Republic Bldg., Cleveland, O.
Ryerson & Son, Inc., Jos. T., 2558 W. 16th St., Chicago, Ill.
Sharon Steel Corp., Sharon, Pa.
United States Steel Corp., 436 Seventh Ave., Pittsburgh, Pa.
Universal-Cyclops Steel Corp., Bridgeville, Pa.
Wheeling Corrugating Co., Wheeling Steel Bldg., Wheeling, W. Va.
Wheeling Steel Corp., Wheeling Steel Corp., Bldg., Wheeling, W. Va.

SHEETS, WROUGHT IRON

Byers Co., A. M., Clark Bldg., Pittsburgh, Pa.

SMOKE BOMBS

(See Bombs, Smoke)

SOLENOID VALVES

(See Valves, Solenoid)

SOUND INSULATION

(See Insulation, Sound)

SPRAY NOZZLES

(See Nozzles, Spray)

STACK CONTROLS

(See Controls, Combustion, Stack)

STEAM FLOW METERS

(See Meters, Steam Flow)

STEAM PRESSURE REGULATORS

(See Regulators, Steam Pressure)

STEAM TRAPS

(See Traps, Steam)

STEAM UNIT HEATERS

(See Unit Heaters, Steam and Hot Water)

STEAM VALVES

(See Valves, Steam and Water)

STEEL BOILERS

(See Boilers, Steel Heating)

STEEL PIPE

(See Pipe, Steel)

STEEL PIPE FITTINGS

(See Fittings, Steel Pipe)

STEEL SHEETS

(See Sheets, Steel)

STEEL TUBING

(See Tubing, Steel)

STERILIZING LAMPS

(See Lamps, Sterilizing)

STOKER-BOILER UNITS

(See Boiler-Stoker Units)

STOKERS, COAL

Under 61 lb. per hr. (I), 61 to 100 lb. (II), 101 to 300 lb. (III), Over 300 lb. (IV)

American Coal Burner Co., 155 E. Superior St., Chicago, Ill. (II) (III)
American Engineering Co., Aramingo Ave. and Cumberland St., Philadelphia, Pa.
Anchor Stove & Range Co., Third & Culbertson, New Albany, Ind. (I) (II) (III) (IV)
Auburn Burner Co., 411 N. Indiana Ave., Auburn, Ind. (I) (II) (III) (IV)
Auburn Foundry Inc., Stoker Div., W. 11th St., Auburn, Ind. (IV)
Auburn Stoker Co., Auburn, Ind. (I) (II) (III)
Automatic Stoker Corp., 2427 W. North Ave., Milwaukee, Wis. (I) (II) (III) (IV)
Babcock & Wilcox Co., 85 Liberty St., New York, N. Y. (II) (III) (IV)
Bardes Range & Foundry Co., E. H., 2619 Colerain Ave., Cincinnati, O. (I)
Beckley Perforating Co., 315 North Ave., Garwood, N. J. (Anthracite) (I)
Bluffton Mfg. Co., 433 W. Main Cross St., Findlay, O. (I) (II) (III) (IV)
Bros Boiler & Mfg. Co., Wm., Nicollet Island, Minneapolis Minn. (I) (II) (III) (IV)

This is Superior Checker Coat

A sheet finding increased favor among artisans who keep their work out of the "ordinary" class in appearance as well as quality. Superior Checker Coat combines a most distinctive appearance with the same uniform, high quality of all Superior Galvanized Sheets. It is galvanized by the Superior Process with a distinctive bright spangle in pronounced individual squares or checkered blocks. It is made of the same special analysis open hearth steel rolled to a uniform gauge and correctly tempered for superior fabricating qualities.

Superior Coated Sheets—including Superior Galvannealed, Commercial Quality Galvanized, Copperior, Tite and Extra Tite Coats—are noted for uniformity of gauge, temper and coating. Every shop test proves their economy. Distributors in principal cities.

THE SUPERIOR SHEET STEEL CO. • CANTON, OHIO
DIVISION OF CONTINENTAL STEEL CORP., U. S. A.

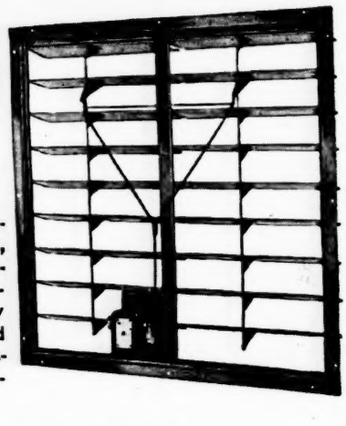
SUPERIOR
OPEN HEARTH STEEL SHEETS

THE SUPERIOR SHEET STEEL CO. • CHECKER COAT • TRADE MARK REG. U.S. PAT. OFF. • CANTON, O.

Brownell Co., 300 N. Findlay St., Dayton, O. (I) (II) (III) (IV)
Burke Stoker & Mfg. Co., 921 W. 19th St., Chicago, Ill. (II) (III) (IV)
Burnham Stoker Co., 505 Columbia St., Vancouver, Wash. (I) (II) (III) (IV)
Burnwell Corp., 125 N. Church St., Allentown, Pa. (I)
Butler Steel Foundry & Iron Co., 3422 Normal Ave., Chicago, Ill. (I) (II) (III) (IV)
Canton Stoker Corp., 507 Andrews Pl., S. W., Canton, O. (II) (III) (IV)
Carnes, Inc., John R., Greenlawn Ave., & Erie R. R., Lima, O. (II) (III) (IV)
Carrier Corp., 302 S. Geddes St., Syracuse, N. Y. (I)
Chicago Automatic Stoker Co., Inc., 14 N. Clinton St., Chicago, Ill. (I) (II) (III)
Columbus Metal Products Inc., 767 N. 4th St., Columbus, O. (II) (III) (IV)
Combustion Engineering Co., Inc., 200 Madison St., New York, N. Y. (II) (III)
Conco Corporation, Mendota, Ill. (I) (II) (III)
Cooper & Cooper, Inc., 37 Fenn St., Pittsfield, Mass. (I)
Cornell Manufacturing Co., 2571 Winthrop Ave., Indianapolis, Ind. (I)
Crane Co., 836 S. Michigan Ave., Chicago, Ill. (Bituminous & Anthracite) (I)
Crown Iron Works, 1229 N. E. Tyler, Minneapolis, Minn. (II) (III) (IV)
Delco Appliance Div., General Motor Sales Corp., Rochester, N. Y. (I)
Delta Stoker Co., Foot of Commonwealth, North Chicago, Ill. (II) (III) (IV)
Detroit Stoker Co., General Motors Bldg., Detroit, Mich. (Sales & Engineering); Monroe, Mich. (Main Office & Works) (II) (III) (IV

Elgo Ventilating Specialties

All-Steel Motorized Shutter



Used for exhaust ventilation in industrial, commercial and residential buildings. Automatically controlled by fan switch. Six-second opening. Positive closing. Storm-proof. All-steel construction.

Write for Catalog of:

Automatic Shutters
Stationary Shutters
Hand Operated Shutters
Ceiling Dampers
Balanced Vent Units
Motorized Shutters

Elgo Shutters are Distributed Through Fan and Air Conditioning Equipment Manufacturers.

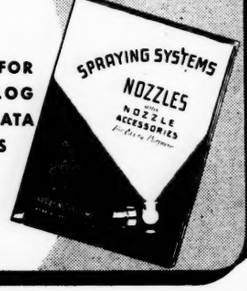
Free Catalog

Elgo Shutter & Manufacturing Co.
635 W. WARREN DETROIT, MICH.

NON-CLOGGING
SPRAY NOZZLES
ALL SIZES *for* Air Conditioning
ALL TYPES
ALL CAPACITIES

A complete line of nozzles for air conditioning and industrial use. Write today for new catalog, data and application sheets and price list.

SEND FOR CATALOG AND DATA SHEETS



SPRAYING SYSTEMS CO.
4031 W. LAKE ST. • CHICAGO

Diamond Castings Co., Terra Cotta Rd., Johnsonburg, Pa. (II) (III)
Dickson Coal Co., Inc., 17 Battery Pl., New York, N. Y. (I)
Dowagiac Steel Furnace Co., Beeson St., Dowagiac, Mich. (I) (II)
Econocol Stoker Div. of Cotta Transmission Corp., 2340 11th St., Rockford, Ill. (I) (II) (III) (IV)
Eddy Stoker Corp., 4717 W. North Ave., Chicago, Ill. (I) (II) (III) (IV)
Electric Furnace-Man, Inc., 101 Park Ave., New York, N. Y. (I) (II) (Anthracite only)
Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Ill. (I) (II) (III) (IV)
Firemood Machine Wks., Converse, Ind. (II) (III) (IV)
Flynn & Emrich Co., 301 Holliday St., Baltimore, Md. (I) (II) (III) (IV)
Frederick Iron & Steel Co., E. 7th & East Sts., Frederick, Md. (I) (II) (III) (IV)
Fuel Savers Inc., 15th & Herr Sts., Harrisburg, Pa. (I) (II) (III) (IV)
Gehl Bros. Mfg. Co., West Bend, Wis. (I) (II) (III) (IV)
General Machinery Co., 3500 Riverside Ave., Spokane, Wash. (I) (II) (III) (IV)
General Stokers, Inc., 2925 N. Broad St., Philadelphia, Pa. (Anthracite) (I)
Germer Stove Co., Erie, Pa. (I)
Grand Rapids Blow Pipe and Dust Arrester Co., 525 Monroe Ave., Grand Rapids, Mich. (II) (III) (IV)
Green Colonial Furnace Co., 322 S. W. Third St., Des Moines, Ia. (I) (II)
Hall-Neal Furnace Co., 1324 N. Capitol Ave., Indianapolis, Ind. (I) (II) (III)
Hamilton Automatic Stoker Corp., 1637 Dixie Highway, Hamilton, O. (I) (II) (III)
Hare Stoker Corp., 4853 Rivard St., Detroit, Mich. (II) (III)
Heating Assurance, Inc., 124 E. Augusta, Spokane, Wash. (I) (II) (III) (IV)
Hemp Engineering & Stoker Corp., Macomb, Ill. (I) (II) (III)
Her-Born Eng. & Mfg. Co., Box 666, Sandusky, O. (II) (III) (IV)
Heritage Stoker Sales, Inc., 105 E. 63rd St., Chicago, Ill. (I) (II) (III)
Hershey Machine & Foundry Co., Motor-stoker Div., Manheim, Pa. (I) (II)
Hess Warming & Ventilating Co., 1221-1227 S. Western Ave., Chicago, Ill. (I)
Hoffman Combustion Eng. Co., 710 Marquette B'dg., Detroit, Mich. (II) (III) (IV)
Holcomb & Hoke Mfg. Co., 1545 Van Buren St., Indianapolis, Ind. (I) (II) (III) (IV)
Illinois Iron & Bolt Co., 918 S. Michigan Ave., Chicago, Ill. (I) (II) (III) (IV)
International Engineering Wks., Inc., Box 71, Framingham, Mass. (II) (III) (IV)
Iron Fireman Mfg. Co., The, 3170 W. 106th St., Cleveland, O. (I) (II) (III) (IV)
Jacobson Machine Works, Inc., A. E., 1090 Tenth Ave., S. E., Minneapolis, Minn. (I) (II) (III)
Johnston & Jennings Co., 877 Addison Rd., Cleveland, O. (II) (III) (IV)
Kisco Boiler & Engineering Co., 3732 Chouteau Ave., St. Louis, Mo. (I) (II) (III)
Kol-Master Corp., Oregon, Ill. (I) (II) (III) (IV)
Laclede Stoker Co., 4438 Hunt Ave., St. Louis, Mo. (IV)
Leach Co., 412 S. Main St., Oshkosh, Wis. (I) (II) (III)
Leffel & Co., James, The, 426 East St., Springfield, O. (I) (II) (III)
Link-Belt Co., Caldwell-Moore Plant, 2410 W. 18th St., Chicago, Ill.
"Loyal Knight" Stokers, Inc., 800 Scheel St., Belleville, Ill. (IV)
McClave-Brooks Co., W. Poplar St., Scranton, Pa. (II) (III) (IV)
Mallory Sales Co., 13904 Lincoln Ave., Dolton, Ill. (II) (III) (IV)
Meir Electric & Machine Co., 3525 E. Washington St., Indianapolis, Ind. (I)
Mesker & Co., Geo. L., 400 N. W. First St., Evansville, Ind. (II) (III)
Meyer Furnace Co., The, 1300 S. Washington St., Peoria, Ill. (I) (II) (III)
Micro-Westco, Inc., Bettendorf Office Bldg., Bettendorf, Ia. (I)
Model Mfg. Co., 316 E. Main St., Richmond, Va. (I) (II) (III)
Moloch Foundry & Machine Co., 111 North St., Kaukauna, Wis. (I) (II) (III)
Motorstoker Div. of Hershey Machine & Foundry Co., Manheim, Pa. (I)
Muncie Gear Works, Inc., N. Vine St., Muncie, Ind. (I) (II) (III) (IV)
Murray Corporation of America, 7700 Russell St., Detroit, Mich. (I)
National Steam Pump Co., 701 W. Johnson St., Upper Sandusky, O. (I) (II) (III) (IV)
Neemes Foundry Inc., 286 First St., Troy, N. Y. (II) (III) (IV)
New Jersey Stoker Corp., 1246 Broad St., Newark, N. J. (I)
Northern Steel & Stoker Corp., 3100 Prospect Rd., Peoria, Ill. (I) (II) (III)
Ormsby-Osterman Co., 6625 Delmar Blvd., St. Louis, Mo. (I) (II) (III)
Orr & Sembower, Inc., Box 817, Reading, Pa. (IV)
Over-Spred Stoker Co., Fulton, Jackson & Jefferson Sts., Ottawa, Ill. (II) (III)
Patterson Foundry & Machine Co., East Liverpool, O. (II) (III) (IV)
Peerless Mfg. Corp., 1400 W. Ormsby Ave., Louisville, Ky. (I) (II) (III) (IV)
Perfectaire Corp., 1102 N. Charles St., Baltimore, Md. (II) (III)
Plymouth Industries, Inc., Stoker Div., Clizbe Bros. Mfg. Co., Plymouth, Ind. (I) (II) (III)
Pocahontas Fuel Company Inc., Stoker Div., 1190 E. 152nd St., Cleveland, O. (I)
Pulvokol, Inc., 406 S. Second Ave., Minneapolis, Minn. (Pulverized Coal Burner) (I)
Racine Stoker Mfg. Co., 1014 Eighth St., Racine, Wis. (I) (II) (III)
Riley Stoker Corp., 9 Neponset St., Worcester, Mass. (II) (III) (IV)
Rosedale Fdry. & Mach. Co., Columbus Ave., N. S., Pittsburgh, Pa. (II) (III) (IV)
Round Oak Co., Dowagiac, Mich. (I) (II) (III)
Rudy Furnace Co., Lock Box 60, Dowagiac, Mich. (I)
Schwab Furnace & Mfg. Co., 193 S. Second St., Milwaukee, Wis. (I) (II) (III)
Schwitzer-Cummins Co., Fan St., Indianapolis, Ind. (I) (II) (III) (IV)
Scott-Newcomb, Inc., 1922 Pine St., St. Louis, Mo. (I)
Sinker-Davis Co., 230 S. Missouri St., Indianapolis, Ind. (I) (II) (III) (IV)
Standard Stoker Corporations, New Albany, Ind. (I) (II) (III) (IV)
Steel Products Engineering Co., Columbia St. at Dakota Ave., Springfield, O. (I) (II) (III) (IV)
Stok-A-Fire Co., Inc., 6504 Olive St., University City, Mo. (I) (II) (III) (IV)
Stokermatic Co., The, 1415 S. State St., Salt Lake City, Utah (I) (II) (III) (IV)
Stoker Products, Inc., 221 W. Prairie Ave., Decatur, Ill. (I) (II) (III)
Taylor Engineering Co., Metropole Hotel, Cincinnati, O. (II) (III) (IV)
Tropic-Air Stoker Co., New London, O. (I) (II) (III)
U. S. Machine Corporation, Lebanon, Ind. (I) (II) (III) (IV)
Wayne Oil Burner Corp., 800 Glasgow Ave., Fort Wayne, Ind. (II) (III)

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. (I) (II)
Whiting Corp., 15613 Lathrop Ave., Harvey, Ill. (I) (II) (III) (IV)
Will-Burt Co., N. Main St., Orrville, O. (I) (II) (III) (IV)

STORAGE TANKS

(See Tanks, Metal, Hot Water Storage)

STORAGE WATER HEATERS

(See Heaters, Steam)

STRAINERS, PIPE LINE

Alco Valve Co., 2628 Big Bend Blvd., St. Louis, Mo.
American District Steam Co., Bryant St, North Tonawanda, N. Y.
American Injector Co., 1481—14th St., Detroit, Mich.
Anderson Co., V. D., The, 1949 W. 96th St., Cleveland, O.
Automatic Products Co., 2450 N. 32nd St., Milwaukee, Wis.
Baker Ice Machine Co. Inc., 1508 Evans St., Omaha, Neb.
Barrett, Haentjens & Co., Hazleton, Pa.
Bishop & Babcock Mfg. Co., 4901 Hamilton Ave., Cleveland, O.
Blackmer Pump Co., 1809 Century Ave., S. W., Grand Rapids, Mich.
Boylston Steam Specialty Co., 116-122 W. Illinois St., Chicago, Ill.
Buffalo Meter Co., 2917 Main St., Buffalo, N. Y.
Cash Co., A. W., P. O. Box 135, Decatur, Ill.
Cash Universal Regulator Co., Marshalltown, Ia.
Cashin Co., W. D., 69 A St., Boston, Mass.
Central Brass Mfg. Co., 2950 E. 55th St., Cleveland, O.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Cuno Engineering Corp., 80 S. Vine St., Meriden, Conn.
Davis Regulator Co., 2546 S. Washtenaw Ave., Chicago, Ill.
Edward Valve & Mfg. Co., Inc., 1200 W. 145th St., East Chicago, Ind.
Elliott Co., Jeannette, Pa.
Fisher Governor Co., 201 S. 1st Ave., Marshalltown, Ia.
Flagg & Co., Inc., Stanley G., 1421 Chestnut St., Philadelphia, Pa.
Foster Engineering Co., 109 Monroe St., Newark, N. J.
Foster Pump Works, Inc., 46-A Washington St., Brooklyn, N. Y.
General Controls Co., 700 W. Ivy St., Glendale, Cal.
Grinnell Co., 260 W. Exchange, Providence, R. I.
Henry Valve Co., 1019 N. Spaulding Ave., Chicago, Ill.
Hoffman Specialty Co., Inc., Waterbury Natl. Bank Bldg., Waterbury, Conn.
Illinois Engineering Co., 2035 S. Racine Ave., Chicago, Ill.
Kaye & MacDonald, Inc., 92 Franklin Ave., West Orange, N. J.
Keckley Co., O. C., 400 W. Madison St., Chicago, Ill.
Kieley & Mueller, 40 W. 13th St., New York, N. Y.
Kraissl Co., Inc., The, Terhune and Williams Aves., Hackensack, N. J.
Leslie Co., Valley Brook & Grant Aves., Lyndhurst, N. J.
Maid-O-Mist, Inc., 215 N. Aberdeen St., Chicago, Ill.
Mason-Neilan Regulator Co., 1190 Adams St., Boston, Mass.
McAlear Mfg. Co., 1901-1909 S. Western Ave., Chicago, Ill.
Milwaukee Valve Co., S. Burrell St., at E. Hayes Ave., Milwaukee, Wis.
Monarch Mfg. Wks., Inc., Salmon & Westmoreland Sts., Philadelphia, Pa.
Mueller Co., Decatur, Ill.
Mueller Steam Specialty Co., 40-20 22nd St., Long Island City, N. Y.
Newark Wire Cloth Co., 351 Verona Ave., Newark, N. J.
Nicholson & Co., W. H., 12 Oregon St., Wilkes-Barre, Pa.
Preferred Utilities Mfg. Corp., 33 W. 60th St., New York, N. Y.
Rosedale Foundry & Machine Co., Columbus & Preble Aves., N. S., Pittsburgh, Pa.
Sarco Co., Inc., 183 Madison Ave., New York, N. Y.
Schade Valve Mfg. Co., 2527 N. Bodine St., Philadelphia, Pa.
Schutte & Koerting Co., 12th & Thompson Sts., Philadelphia, Pa.
Sheffler-Gross Co., Drexel Bldg., Philadelphia, Pa.
Spence Engineering Co., Inc., 28 Grant St., Walden, N. Y.
Spray Engineering Co., 114 Central St., Somerville, Mass.
Staples & Pfeiffer, Ltd., 528 Bryant St., San Francisco, Cal.
Sterling, Inc., 3738 N. Holton St., Milwaukee, Wis.
Straight Line Foundry & Machine Corp., Direct Separator Div., The, 218 S. Geddes St., Syracuse, N. Y.
Streamline Pipe & Fittings Div., Mueller Brass Co., 1925 Lapeer Ave., Port Huron, Mich.
Strong, Carlisle & Hammond Co., The, 1392 W. Third St., Cleveland, O.
Swartwout Co., 18511 Euclid Ave., Cleveland, O.
Trane Co., The, La Crosse, Wis.
Trimount Rotary Power Co., 398 Whiting Ave., East Dedham, Mass.
Tryco Products, Inc., Railroad Squ., Westfield, Mass.
Watson & McDaniel Co., 440 N. Marshall, Philadelphia, Pa.
Watts Regulator Co., 10 Embankment St., Lawrence, Mass.
Webster & Co., Warren, 17th & Federal Sts., Camden, N. J.
Wright-Austin Co., 315 W. Woodbridge St., Detroit, Mich.

SUMP PUMPS

(See Pumps, Sump)

SUPERHEATERS, STEAM

Babcock & Wilcox Co., 85 Liberty St., New York, N. Y.
Bros Boiler & Mfg. Co., Wm., Nicollet Island, Minneapolis, Minn.
Combustion Engineering Co., Inc., 200 Madison Ave., New York, N. Y.
Foster Wheeler Corp., 165 Broadway, New York, N. Y.
Johnston Bros., Inc., Ferrysburg, Mich.
Marley Co., 3001 Fairfax Rd., Kansas City, Kan.
Selas Co., The, 18th St. at Indiana Ave., Philadelphia, Pa.

SURFACE, AIR COOLING

For Brine (B), Cold Water (W), Direct Expansion (D)

Acme Industries, Inc., Cor. Mechanic and Ganson Sts., Jackson, Mich. (B) (W) (D)
Advanced Refrigerating Systems Co., 33rd & Arch Sts., Philadelphia, Pa. (B) (W) (D)
Aerofin Corp., 410 S. Geddes St., Syracuse, N. Y. (B) (W) (D)
American Coils, Inc., 25-27 Lexington St., Newark, N. J. (B) (W) (D)
American Engineering Co., Aramingo Ave. and Cumberland St., Philadelphia, Pa.
Baker Ice Machine Co., Inc., 1508 Evans St., Omaha, Neb.
Beacon-Morris Corp., 702 Beacon St., Boston, Mass. (B) (W) (D)
Bros Boiler & Mfg. Co., Wm., Nicollet Island, Minneapolis, Minn.
Bush Mfg. Co., 100 Wellington St., Hartford, Conn. (B) (W) (D)
Campbell Heating Co., 2445 Charlotte St., Kansas City, Mo. (D)
Conditionaire Unit Co., 2821 Montrose Ave., Chicago, Ill. (D)
Drayer & Hanson, Inc., 738 E. Pico Blvd., Los Angeles, Cal. (B) (W) (D)
Dunham Co., C. A., 450 E. Ohio St., Chicago, Ill. (W)
Fedders Mfg. Co., Inc., 57 Tonawanda St., Buffalo, N. Y. (W) (D)
Frick Co., Waynesboro, Pa.
G. & O. Mfg. Co., 138 Winchester Ave., New Haven, Conn. (B) (W) (D)
General Electric Co., Air Conditioning and Commercial Refrigeration Dept., 5 Lawrence St., Bloomfield, N. J. (W) (D)
General Refrigeration Div., Yates-American Machine Co., Beloit, Wis. (B) (W) (D)
Griscom-Russel. Co., The, 285 Madison Ave., New York, N. Y
Harris & Co., Arthur, 210 N. Aberdeen St., Chicago, Ill.
Industrial Mfg. & Engineering Co., 3845 N. Ravenswood Ave., Chicago, Ill. (B) (W)
Johnson Fan & Blower Corp., 1320 W. Lake St., Chicago, Ill. (W)
Kennard, Inc., Sam, 3333-35 Market St., St. Louis, Mo. (W) (D)
Kramer Trenton Co., 626 Brunswick Ave., Trenton, N. J. (B) (W) (D)
Larkin Coils, Inc., 519 Memorial Dr., S. E., Atlanta, Ga. (B) (W) (D)
Manufacturers Fin Coil Co., 2505-7 S. Pulaski Rd., Chicago, Ill. (B) (W) (D)
Marlo Coil Co., 6135 Manchester Ave., St. Louis, Mo. (B) (W) (D)
McCord Radiator & Mfg. Co., 2587 E. Grand Blvd., Detroit, Mich. (B) (W) (D)
Modine Mfg. Co., 17th St., Racine, Wis. (B) (W) (D)
Mojonnier Bros. Co., 4601 W. Ohio St., Chicago, Ill. (W) (D)
Nesbitt, Inc., John J., & Buckeye Blower Co., State Rd. & Rhawn St., Philadelphia, Pa. (W)
Ohio Pipe Bending & Machine Co., 3900-3910 Trent Ave., Cleveland, O. (B) (D)
Palmer Mfg. Corp., Phoenix, Ariz. (W)
Peerless of America, Inc., 515 W. 35th St., Chicago, Ill. (B) (W) (D)
Perfex Corp. (Unit Heater Div.), 500 W. Oklahoma Ave., Milwaukee, Wis. (W)
Refrigeration Appliances, Inc., 917-923 W. Lake St., Chicago, Ill. (W) (D)
Refrigeration Economics Co., Inc., 1232 Second St., N. E., Canton, O. (B) (W) (D)
Reliance Refrigerating Machine Co., 3401 N. Kedzie Ave., Chicago, Ill. (D)
Rempe Co., 340 N. Sacramento Blvd., Chicago, Ill. (B) (W) (D)
Roessing Mfg. Co., 1616 Noble St., Sharpsburg Sta., Pittsburgh, Pa. (B) (W) (D)
Rome-Turney Radiator Co., Canal St., Rome, N. Y. (B) (W) (D)
Star Radiator Co., 649 Ceres Ave., Los Angeles, Cal. (W)
Sturtevant Co., B. F., Damon St., Hyde Park, Boston, Mass.
Super Radiator Corp., 320 Plymouth Bldg., Minneapolis, Minn. (B) (W)
Tilco-Fin Inc., 58 Second Ave., Brooklyn, N. Y. (B) (W) (D)
Trane Co., The, La Crosse, Wis. (B) (W) (D)
U. S. Air Conditioning Corp., 2101 Kennedy St., N. E., Minneapolis, Minn. (W) (D)
Unit Heater & Cooler Co., 1002-1024 Third St., Wausaw, Wis. (R) (W) (D)
Vilter Mfg. Co., 2148 S. First St., Milwaukee, Wis. (B) (W)
Westinghouse Electric & Mfg. Co., Springfield, Mass. (W) (D)
Wing Mfg. Co., L. J., 158 W. 14th St., New York, N. Y. (W)
Yates-American Machine Co., Beloit, Wis. (W) (D)
York Ice Machinery Corp., Roosevelt Ave., York, Pa. (B) (W) (D)
Young Radiator Co., 709 S. Marquette St., Racine, Wis. (B) (W) (D)

SURFACE, HEATING INDIRECT

Iron and Steel

Airtherm Mfg. Co., 700 S. Spring Ave., St. Louis, Mo.
American Radiator & Standard Sanitary Corp., Bessemer Bldg., Pittsburgh, Pa.
Bayley Blower Co., 1817 S. 66th St., Milwaukee, Wis.
Bros Boiler & Mfg. Co., Wm., Nicollet Island, Minneapolis, Minn.
Campbell Heating Co., E. K., 2445 Charlotte St., Kansas City, Mo.
Griscom-Russell Co., The, 285 Madison Ave., New York, N. Y.
New York Blower Co., 3155 Shields Ave., Chicago, Ill.
Refrigeration Economics Co., Inc., 1232 Second St., N.E., Canton, O.
Unit Heater & Cooler Co., 1002-1024 Third St., Wausaw, Wis.
Wolff & Munier, Inc., 222 E. 41st St., New York, N. Y. (For panel heating)

SURFACE, HEATING INDIRECT

Non-Ferrous

Aerofin Corp., 410 S. Geddes St., Syracuse, N. Y.
American Radiator & Standard Sanitary Corp., Bessemer Bldg., Pittsburgh, Pa.
Bayley Blower Co., 1817 S. 66th St., Milwaukee, Wis.
Beacon-Morris Corp., 702 Beacon St., Boston, Mass.
Bros Boiler & Mfg. Co., Wm., Nicollet Island, Minneapolis, Minn.
Bush Mfg. Co., 100 Wellington St., Hartford, Conn.
Campbell Heating Co., E. K., 2445 Charlotte St., Kansas City, Mo.
Drayer & Hanson, Inc., 738 E. Pico Blvd., Los Angeles Cal.
Dunham Co., C. A., 450 E. Ohio St., Chicago, Ill.
Fedders Mfg. Co., Inc., 57 Tonawanda St., Buffalo, N. Y.
G. & O. Mfg. Co., 138 Winchester Ave., New Haven, Conn.
General Electric Co., Air Conditioning and Commercial Refrigeration Dept., 5 Lawrence St., Bloomfield, N. J.
Griscom-Russell Co., The, 285 Madison Ave., New York, N. Y.
Harris & Co., Arthur, 210 N. Aberdeen St., Chicago, Ill.
Industrial Mfg. & Engineering Co., 3845 N. Ravenswood Ave., Chicago, Ill.
Johnson Fan & Blower Corp., 1320 W. Lake St., Chicago, Ill.
Kennard, Inc., Sam, 3333-35 Market St., St. Louis, Mo.
Kramer Trenton Co., 626 Brunswick Ave., Trenton, N. J.
McCord Radiator & Mfg. Co., 2587 E. Grand Blvd., Detroit, Mich.
McQuay, Inc., 1600 Broadway, N. E., Minneapolis, Minn.
Modine Mfg. Co., 17th St., Racine, Wis.
Nesbitt, Inc., John J., & Buckeye Blower Co., State Rd. & Rhawn St., Philadelphia, Pa.
Niagara Blower Co., 6 E. 45th St., New York, N. Y.
Palmer Mfg. Corp., Phoenix, Ariz.
Peerless of America Inc., 515 W. 35th St., Chicago, Ill.
Perfex Corp. (Unit Heater Div.), 500 W. Oklahoma Ave., Milwaukee, Wis.
Refrigeration Economics Co., Inc., 1232 Second St., N.E., Canton, O.
Rempe Co., 340 N. Sacramento Blvd., Chicago, Ill.
Rome-Turney Radiator Co., Canal St., Rome, N. Y.
Star Radiator Co., 649 Ceres Ave., Los Angeles, Cal.
Sturtevant Co., B. F., Damon St., Hyde Park, Boston, Mass.
Super Radiator Corp., 320 Plymouth Bldg., Minneapolis, Minn.
Tilco-Fin Inc., 58 Second Ave., Brooklyn, N. Y.
Trane Co., The, La Crosse, Wis.
U. S. Air Conditioning Corp., 2101 Kennedy St., N. E., Minneapolis, Minn.
Unit Heater & Cooler Co., 1002-1024 Third St., Wausau, Wis.
Wing Mfg. Co., L. J., 158 W. 14th St., New York, N. Y.
Yates-American Machinery Co., Beloit, Wis.

AIR CONDITIONING NOZZLES

Nozzles of unique Yarway Involute Design.

No internal parts or vanes to clog or erode.

Insure trouble-free air washing service.

Sizes and types for all requirements.

Many large users—installations total more than 5 million gallons per minute in water cooling and air conditioning service. Write for Bulletin N-615.

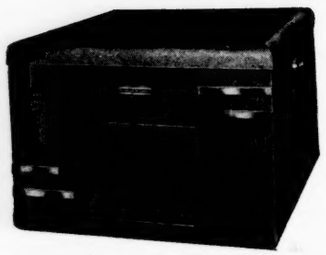
YARNALL-WARING COMPANY
104 MERMAID AVENUE
PHILADELPHIA

YARWAY

DIRECT EXPANSION ★ COLD WATER

usAIRco Air Conditioning Equipment

COIL UNITS...



ENGINEERED AND PRICED FOR GREATER VALUE

You can get more for your money from usAIRco. Experienced engineering, economical production, proved and tested equipment. All ratings guaranteed, plus many superior features.

WRITE FOR DATA AND PRICES

UNITED STATES AIR CONDITIONING CORP. HV740
Northwestern Terminal, Minneapolis, Minn.
Send Data on usAIRco Coil Units.

Name.....
Address.....
Town..... State.....

KNOW THE COMPANY AND THE LINE

York Ice Machinery Corp., Roosevelt Ave., York, Pa.
Young Radiator Co., 709 S. Marquette St., Racine, Wis.

SWITCHES
Electric

Adam Electric Co., Frank, 3650 Windsor St., St. Louis, Mo.
Allen-Bradley Co., 1335 S. First St., Milwaukee, Wis.
Arrow-Hart & Hegeman Elect. Co., 103 Hawthorn St., Hartford, Conn.
Automatic Switch Co., 41 E. 11th St., New York, N. Y.
Clark Controller Co., 1146 E. 152nd St., Cleveland, O.
Cooper Co., Clark, 159 Jefferson St., Philadelphia, Pa.
Cutler-Hammer, Inc., N. 12th St. and W. St. Paul Ave., Milwaukee, Wis.
Delta-Star Electric Co., 2400 Block, W. Fulton St., Chicago, Ill.
Dunn, Inc., Struthers, 1332 Cherry St., Philadelphia, Pa.
Electric Controller & Mfg. Co., 2700 E. 79th St., Cleveland, O.
General Controls Co., 700 W. Ivy St., Glendale, Cal.
General Electric Co., 1 River Rd., Schenectady, N. Y.
Hart Mfg. Co., Hamilton St., Hartford, Conn.
Marsh, Corp., Jas. P., 2089 Southport Ave., Chicago, Ill.
McDonnell & Miller, 400 N. Michigan Ave., Chicago, Ill.
Mercoid Corp., The, 4201 Belmont Ave., Chicago, Ill.
Micro Switch Corp., 1 E. Spring St., Freeport, Ill.
Minneapolis-Honeywell Regulator Co., 2701 Fourth Ave., South, Minneapolis, Minn.
Monitor Controller Co., 51 S. Gay St., Baltimore, Md.
Penn Electric Switch Co., Box 556, Goshen, Ind.
Perfex Corp. (Controls Div.), 500 W. Oklahoma Ave., Milwaukee, Wis.
Square D Co., 6060 Rivard St., Detroit, Mich.
Square D Co., 4041 N. Richards St., Milwaukee, Wis.
Tork Clock Co., Inc., 1 Grove St., Mount Vernon, N. Y.
Trumbull Electric Mfg. Co., The, Woodford Ave., Plainville, Conn.
Ward Leonard Electric Co., 37 South St., Mount Vernon, N. Y.
Webster Electric Co., Clark & DeKoven Aves., Racine, Wis.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
White Mfg. Co., 2362 University Ave., St. Paul, Minn.

SWITCHES
Float, Refrigeration

Alco Valve Co., 2628 Big Bend Blvd., St. Louis, Mo.
Baker Ice Machine Co. Inc., 1508 Evans St., Omaha, Neb.
Clark Controller Co., 1146 E. 152nd St., Cleveland, O.
McDonnell & Miller, 400 N. Michigan Ave., Chicago, Ill.
Schaub Engineering Co., Fred H., 325 W. Huron St., Chicago, Ill.
Square D Co., 4041 N. Richards St., Milwaukee, Wis.
Ward Leonard Electric Co., 37 South St., Mt. Vernon, N. Y.

SWITCHES
Mercury

Automatic Temperature Control Co., 22 E. Logan St., Philadelphia, Pa.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., 4534 Wayne Ave., Philadelphia, Pa.
Durakool, Inc., 1010 N. Main St., Elkhart, Ind.
General Electric Co., 1 River Rd., Schenectady, N. Y.
Hart Mfg. Co., Hamilton St., Hartford, Conn.
Jefferson Electric Co., 25th & Madison St., Bellwood, Ill.
Mercoid Corp., The, 4201 Belmont Ave., Chicago, Ill.
Minneapolis-Honeywell Regulator Co., 2701 Fourth Ave., South, Minneapolis, Minn.

SWITCHES
Pressure and Vacuum

Allen-Bradley Co., 1335 S. First St., Milwaukee, Wis.
Au-Temp-Co Corp., 1 Park Ave., New York, N. Y.
Automatic Control Co., 1005 University Ave., St. Paul, Minn.
Boston Auto Gage Co., 70 West St., Pittsfield, Mass.
Clark Controller Co., 1146 E. 152nd St., Cleveland, O.
Cooper Co., Clark, 159 Jefferson St., Philadelphia, Pa.
Cutler-Hammer, Inc., N. 12th St. and W. St. Paul Ave., Milwaukee, Wis.
Detroit Lubricator Co., 5900 Trumbull Ave., Detroit, Mich.
Duro Co., 537-40 E. Monument St., Dayton, O.
Friez & Sons, Julien P., 4 N. Central Ave., Baltimore, Md.
General Electric Co., 1 River Rd., Schenectady, N. Y.
Gilbert & Barker Mfg. Co., Springfield, Mass.
Gleason-Avery, Inc., 27 Clark St., Auburn, N. Y.
Marsh, Corp., Jas. P., 2089 Southport Ave., Chicago, Ill.
Mercoid Corp., The, 4201 Belmont Ave., Chicago, Ill.
Minneapolis-Honeywell Regulator Co., 2701 Fourth Ave., South, Minneapolis, Minn.
Monitor Controller Co., 51 S. Gay St., Baltimore, Md.
Penn Electric Switch Co., Box 556, Goshen, Ind.
Perfex Corp. (Controls Div.), 500 W. Oklahoma Ave., Milwaukee, Wis.
Pioneer Heat Regulator Div., Master Electric Co., The, 100 Davis Ave., Dayton, O.
Spencer Thermostat Co., 43 Forest St., Attleboro, Mass.
Square D Co., 6060 Rivard St., Detroit, Mich.
Square D Co., 4041 N. Richards St., Milwaukee, Wis.
Uniflow Mfg. Co., E. Lake Rd., Erie, Pa.
Ward Leonard Electric Co., 37 South St., Mt. Vernon, N. Y.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
White-Rodgers Electric Co., 1289 Cass Ave., St. Louis, Mo.

SWITCHES
Time

Au-Temp-Co Corp., 1 Park Ave., New York, N. Y.
Automatic Temperature Control Co., Inc., 22 E. Logan St., Philadelphia, Pa.
Cramer Co., Inc., R. W., The, Centerbrook, Conn.
Detroit Lubricator Co., 5900 Trumbull Ave., Detroit, Mich.
Edison, Inc., Thomas A., Edison Electrical Controls Div., Lakeside Ave., West Orange, N. J.
General Controls Co., 700 W. Ivy St., Glendale, Cal.
General Electric Co., 1 River Rd., Schenectady, N. Y.
Gleason-Avery, Inc., 27 Clark St., Auburn, N. Y.
Guardian Electric Mfg. Co., 1621 W. Walnut St., Chicago, Ill.
Industrial Engineering Corp., Evansville, Ind.
Mercoid Corp., The, 4201 Belmont Ave., Chicago, Ill.
Minneapolis-Honeywell Regulator Co., 2701 Fourth Ave., South, Minneapolis, Minn.
Paragon Electric Co., 37 W. Van Buren St., Chicago, Ill.
Penn Electric Switch Co., Box 556, Goshen, Ind.
Perfex Corp. (Controls Div.), 500 W. Oklahoma Ave., Milwaukee, Wis.
Reliance Automatic Lighting Co., 1929 Mead St., Racine, Wis.
Rhodes, Inc., M. H., 30 Bartholomew St., Hartford, Conn.
Sampsel Time Control, Inc., Spring Valley, Ill

Sangamo Electric Co., 1301 N. 11th St., Springfield, Ill.
Spencer Thermostat Co., 43 Forest St., Attleboro, Mass.
Tork Clock Co., Inc., 1 Grove St., Mount Vernon, N. Y.
Ward Leonard Electric Co., 37 South St., Mount Vernon, N. Y.
Zenith Electric Co., 607 S. Dearborn St., Chicago, Ill.

SYSTEMS
Automatic Temp. Control

Au-Temp-Co Corp., 1 Park Ave., New York, N. Y.
Automatic Temperature Control Co., 22 E. Logan St., Philadelphia, Pa.
Barber-Colman Co., 225 Loomis St., Rockford, Ill.
Bristol Co., Platts Bridge, Waterbury, Conn.
Cooper Co., Clark, 159 Jefferson St., Philadelphia, Pa.
Dunham Co., C. A., 450 E. Ohio St., Chicago, Ill.
Foxboro Co., 28 Neponset Ave., Foxboro, Mass.
General Controls Co., 700 W. Ivy St., Glendale, Cal.
Herske & Timmis, Inc., 33 W. 60th St., New York, N. Y.
Illinois Engineering Co., 2035 S. Racine Ave., Chicago, Ill.
Johnson Service Co., 507 E. Michigan St., Milwaukee, Wis.
Lawler Automatic Controls, 453 N. MacQuesten Parkway, Mt. Vernon, N. Y.
Leeds & Northrup Co., 4970 Stenton Ave., Philadelphia, Pa.
Leslie Co., Valley Brook & Grant Aves., Lyndhurst, N. J.
Marsh Tritrol Co., 600 S. Michigan Ave., Chicago, Ill.
Mason-Neilan Regulator Co., 1190 Adams St., Boston, Mass.
Mercoid Corp., The, 4201 Belmont Ave., Chicago, Ill.
Minneapolis-Honeywell Regulator Co., 2701 Fourth Ave., South, Minneapolis, Minn.
Paragon Electrical Co., 37 W. Van Buren St., Chicago, Ill.
Penn Electric Switch Co., Box 556, Goshen, Ind.
Powers Regulator Co., The, 2756 Greenview Ave., Chicago, Ill.
Sarco Co., Inc., 183 Madison Ave., New York, N. Y.
Spence Engineering Co., Inc., 28 Grant St., Walden, N. Y.
Spencer Thermostat Co., 34 Forest St., Attleboro, Mass.
Sterling, Inc., 3738 N. Holton St., Milwaukee, Wis.
Tallmadge & Co., Webster, 255 N. 18th St., Orange, N. J.
Thrush & Co., H. A., 21 E. Riverside Dr., Peru, Ind.
Trane Co., The, La Crosse, Wis.
Webster & Co., Warren, 17th & Federal Sts., Camden, N. J.
Wheelco Instruments Co., 1933 S. Halsted St., Chicago, Ill.
White-Rodgers Electric Co., 1289 Cass Ave., St. Louis, Mo.

SYSTEMS
Combustion Control

Askania Regulator Co., 1605 S. Michigan Ave., Chicago, Ill.
Bailey Meter Co., 1050 Ivanhoe Rd., Cleveland, O.
Bowser & Co., Inc., S. F., 1302 E. Creighton Ave., Fort Wayne, Ind.
Bristol Co., Platts Bridge, Waterbury, Conn.
Brooke Engineering Co., Inc., 4517 Wayne Ave., Philadelphia, Pa.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., 4534 Wayne Ave., Philadelphia, Pa.
Cash Co., A. W., P. O. Box 135, Decatur, Ill.
Defender Automatic Regulator Co., 308 S. 8th St., St. Louis, Mo.
Denver Fire Clay Co., 2301 Blake St., Denver, Colo.
Engineer Co., 17 Battery Pl., New York, N. Y.
Foster Wheeler Corp., 165 Broadway, New York, N. Y.
Hagan Corp., 600 Bowman Bldg., Pittsburgh, Pa.
Hays Corp., E. 8th St., Michigan City, Ind.
Huyette Co., Inc., Paul B., 401 N. Broad St., Philadelphia, Pa.
Illinois Engineering Co., 2035 S. Racine Ave., Chicago, Ill.
Leeds & Northrup Co., 4970 Stenton Ave., Philadelphia, Pa.
Mason-Neilan Regulator Co., 1190 Adams St., Boston, Mass.
Mercoid Corp., The, 4201 Belmont Ave., Chicago, Ill.
National Brass Co., 1603 Madison Ave., Grand Rapids, Mich.
Republic Flow Meters Co., 2240 Diversey Pkwy., Chicago, Ill.
Ruggles-Klingemann Mfg. Co., 4 Foster Ct., Salem, Mass.
Shallcross Controls, Inc., 121 N. Broadway, Milwaukee, Wis.
Spence Engineering Co., Inc., 28 Grant St., Walden, N. Y.
White-Rodgers Electric Co., 1289 Cass Ave., St. Louis, Mo.

SYSTEMS
Drying

Airtherm Mfg. Co., 700 S. Spring Ave., St. Louis, Mo.
Allen Co., E. H., 22 Dorrance St., Boston, Mass.
Buffalo Forge Co., 171 Mortimer St., Buffalo, N. Y.
Coe Mfg. Co., Bank St., Painesville, O.
Jeffrey Mfg. Co., 904-99 N. Fourth St., Columbus, O.
Kirk & Blum Mfg. Co., 2871 Spring Grove Ave., Cincinnati, O.
McCann Furnace Co., 5005 Euclid Ave., Cleveland, O.
Midwest-Fulton Machine Co., 24 N. Patterson Blvd., Dayton, O.
Philadelphia Drying Machinery Co., 3353 Stokley St., Philadelphia, Pa.
Proctor & Schwartz, Inc., 7th St. & Tabor Rd., Philadelphia, Pa.
Ross, J. O., Engrg. Corp., 350 Madison Ave., New York, N. Y.
Sturtevant, B. F., Co., Damon St., Hyde Park, Boston, Mass.
Trane Co., The, La Crosse, Wis.
Western Precipitation Co., 1016 W. 9th St., Los Angeles, Cal.
Young & Bertke Co., 2240 Hulbert Ave., Cincinnati, O.

SYSTEMS
Duct Sprinkler

Rockwood Sprinkler Co., 38 Harlow St., Worcester, Mass.

SYSTEMS
Dust Collection

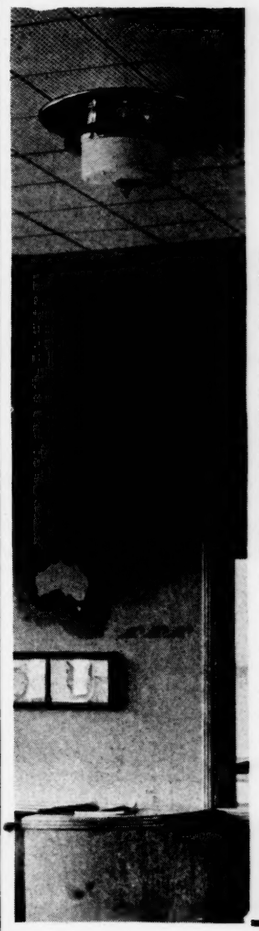
(See Collectors, Dust)

SYSTEMS
Industrial, High Temp.

Automatic Temperature Control Co., Inc., 22 E. Logan St., Philadelphia, Penn.
Dow Chemical Co., 915 Jefferson Ave., Midland, Mich.
Cooper Co., Clark, 159 Jefferson St., Philadelphia, Pa.
Foster Wheeler Corp., 165 Broadway, New York, N. Y.
Herske & Timmis, Inc., 33 W. 60th St., New York, N. Y.
McCann Furnace Co., 5005 Euclid Ave., Cleveland, O.
Minneapolis-Honeywell Regulator Co., 2701 Fourth Ave., South, Minneapolis, Minn.
Parks-Cramer Co., 970 Main St., Fitchburg, Mass.
Ross Engineering Corp., J. O., 350 Madison Ave., New York, N. Y.
Sturtevant Co., B. F., Damon St., Hyde Park, Boston, Mass.
Thwing-Albert Instrument Co., 3339 Lancaster Ave., Philadelphia, Pa.
Wheelco Instruments Co., 1933 S. Halsted St., Chicago, Ill.

SYSTEMS
Spray Cooling

Baker Ice Machine Co. Inc., 1508 Evans St., Omaha, Neb.



Draftless AIR DISTRIBUTOR

Shown is one of the Demuth Air Distributors with which Dr. Goodman's Animal Hospital in Manhasset, N. Y., is equipped.

FOR ANY AIR VELOCITY—
Standard sizes can be selected to handle any problem of heating or cooling. They provide an even distribution of air throughout every room. Capacities from 80-15,000 C.F.M.

LOW COST—
Their compactness and simplicity of design makes them economical to use even where the budget is limited.

ATTRACTIVE APPEARANCE—
Designed to blend with the most modern interiors, they can be used with almost any type of lighting fixture. Write for illustrated folder.

CHARLES DEMUTH & SONS
112-07 New York Blvd.
JAMAICA NEW YORK

E-Z

Radiator Hangers The efficient, durable, economical way to hang radiators. A type for every radiator and every situation.

Concrete Inserts Only one size is needed for all size pipe hangers. Easily adjustable, with play for expansion.

Lavatory Hangers The strong, permanent, economical way to suspend lavatories from the wall.

HEALY-RUFF CO., 772 Hampden Ave.
St. Paul Minnesota

SOMERS HAIR GLASS FILTER

Make the first cost the last cost!

Where Somers Hair Spun Glass Filters are installed as original or replacement equipment there's an end to the cost. Somers Filters are washable, odorless, non-absorptive, do not rot, and are practically indestructible.

Dust, dirt, pollen and detritus in the air stream effectively removed with minimum back pressure. No adhesives required.

Somers Filters may be cleaned easily by using the stream from an ordinary water hose (at city pressures) pinched to obtain a spray effect.

For complete details and prices, write giving the c.f.m. per unit and dimensions of present master holding frame. A few choice territories are available for representatives. Full particulars on application.

H. J. SOMERS, INC., 6065 WABASH AVE., DETROIT, MICH.

Binks Mfg. Co., 3114-40 Carroll Ave., Chicago, Ill.
Buffalo Forge Co., 171 Mortimer St., Buffalo, N. Y.
Carrier Corp., 302 S. Geddes St., Syracuse, N. Y.
Marley Co., Fairfax Rd. & Marley Ave., Kansas City, Kans.
Schubert - Christy Corp., 1600 Georgia St., St. Louis, Mo.
Schutte & Koerting Co., 12th & Thompson Sts., Philadelphia, Pa.
Spray Engrg. Co., 111 Central St., Somerville, Mass.
Sturtevant Co., B. F., Damon St., Hyde Park, Boston, Mass.
Trane Co., The, La Crosse, Wis.
Yarnall-Waring Co., Chestnut Hill, Philadelphia, Pa.

SYSTEMS
Zone Control

Au-Temp-Co Corp., 1 Park Ave., New York, N. Y.
Automatic Temperature Control Co., Inc., 22 E. Logan St., Philadelphia, Pa.
Barber-Colman Co., 225 Loomis St., Rockford, Ill.
Barnes & Jones, Inc., 128 Brookside Ave., Jamaica Plain, Boston, Mass.
Cooper Co., Clark, 159 Jefferson St., Philadelphia, Pa.
Dunham Co., C. A., 450 E. Ohio St., Chicago, Ill.
Foxboro Co., 106 Neponset Ave., Foxboro, Mass.
General Controls Co., 700 W. Ivy St., Glendale, Cal.
Herske & Timmis, Inc., 33 W. 60th St., New York, N. Y.
Illinois Engineering Co., 2035 S. Racine Ave., Chicago, Ill.
Johnson Service Co., 507 E. Michigan St., Milwaukee, Wis.
Marsh Tritrol Co., 600 S. Michigan Ave., Chicago, Ill.
Mercoid Corp., The, 4201 Belmont Ave., Chicago, Ill.
Minneapolis-Honeywell Regulator Co., 2701 Fourth Ave., South, Minneapolis, Minn.
Raymond Co., F. I., 629 W. Washington Blvd., Chicago, Ill.
Sarco Co., Inc., 183 Madison Ave., New York, N. Y.
Spence Engineering Co., Inc., 28 Grant St., Walden, N. Y.
Tallmadge & Co., Webster, 255 N. 18th St., East Orange, N. J.
Thrush & Co., H. A., Peru, Ind.
Webster & Co., Warren, 17th & Federal Sts., Camden, N. J.

TANKS, METAL
Open

Allis-Chalmers Co., 1126 S. 70th St., Milwaukee, Wis.
Babcock & Wilcox Co., 85 Liberty St., New York, N. Y.
Baker Ice Machine Co., Inc., 1508 Evans St., Omaha, Nebr.
Bigelow Co., The, 92 River St., New Haven, Conn.
Bowser, S. F., & Co., Inc., 1302 E. Creighton Ave., Fort Wayne, Ind.
Bros Boiler & Mfg. Co., Wm., Nicollet Island, Minneapolis, Minn.
Brownell Co., 300 N. Findlay St., Dayton, O.
Burhorn, Edwin, Co., 1 Newark St., Hoboken, N. J.
Caldwell, W. E., Co., Inc., 1970 Brook St., Louisville, Ky.
Chicago Boiler Co., 1965 Clybourn Ave., Chicago, Ill.
Chicago Bridge & Iron Company, 3325 Michigan Ave., Chicago, Ill.
Connery Construction Co., 2nd & Luzerne Sts., Philadelphia, Pa.
Devine, J. P., Mfg. Co., Inc., 909 Shawnee Ave., Mt. Vernon, Ill.
Downingtown Iron Works, Wallace Ave., Downingtown, Pa.
Edge Moor Iron Works, Inc., 30 Rockefeller Plaza, New York, N. Y.
Farrar & Trefts, Inc., 20 Milburn St., Buffalo, N. Y.
Fingles Co., The, Reistertown Rd. at Elgin Ave., Baltimore, Md.
Frick Co., Waynesboro, Pa.
General Machinery Co., E. 3500 Riverside Ave., Spokane, Wash.
Godfrey Keeler Co., Inc., 70 Warren St., New York, N. Y.
Graver Tank & Mfg. Co., Inc., 4130 Todd Ave., East Chicago, Ind.
Hamburg Boiler Works, Inc., Grand St., Hamburg, Pa.
Heilman Boiler Works, Allentown, Pa.
Henderson Bros. Co., 133 S. Leonard St., Waterbury, Conn.
Hendrick Mfg. Co., 37 Dundaff St., Carbondale, Pa.
Hodge Boiler Works, 111 Summer St., East Boston, Mass.
International Engrg. Works, Inc., Box 71, Framingham, Mass.
Jones & Laughlin Steel Corp., Third & Ross St., Pittsburgh, Pa.
Keeler, E., Co., 238 West St., Williamsport, Pa.
Koven & Brother, Inc., L. O., 154 Ogden Ave., Jersey City, N. J.
Kroeschell Boiler Co., 100 Reichert Ct., Racine, Wis.
Lehigh Fan & Blower Co., Front & Linden Sts., Allentown, Pa.
Littleford Bros., 443-457 E. Pearl St., Cincinnati, O.
Milwaukee Reliance Boiler Works, 2784 N. 32nd St., Milwaukee, Wis.
Mojonnier Bros. Co., 4601 W. Ohio St., Chicago, Ill.
Morrison Bros., 24th & Elm Sts., Dubuque, Iowa.
Munroe, R., & Sons Mfg. Corp., 23rd & Smallman Sts., Pittsburgh, Pa.
National Tank Co., Box 1588, Tulsa, Okla.
New England Tank & Tower Co., Everett, Mass.
Ohio Machine & Boiler Co., 1501-13 University Rd., Cleveland, O.
Oil City Tank & Boiler Co., Oil City, Pa.
Pfaudler Co., 89 East Ave., Rochester, N. Y.
Philips & Davies, Inc., Kenton, O.
Porcupine Co., Bridgeport, Conn.
Quaker City Iron Works, 3407 Aramingo Ave., Philadelphia, Pa.
Richmond Engrg. Co., Inc., P. O. Box 514, Richmond, Va.
Scaife, Wm. B., & Sons Co., 1st & Ann Sts., Oakmont, Pa.
Sims Co., P. O. Box 1096, Erie, Pa.
Sioux City Foundry & Boiler Co., E. 8th & Division Sts., Sioux City, Ia.
Southbridge Roofing Co., Inc., Hartwell and Chapin Sts., Southbridge, Mass.
Titusville Boiler Div., The, Struthers-Wells-Titusville Corp., Titusville, Pa.
Treadwell, M. H., Co., 140 Cedar St., New York, N. Y.
Union Boiler & Mfg. Co., 4th St., & Reading R. R., Lebanon, Pa.
Union Iron Works, 1500 Cascade St., Erie, Pa.
Walsh Holyoke Steam Boiler Wks., Inc., 110 Appleton St., Holyoke, Mass.
Wickes Boiler Co., 502 N. Water St., Saginaw, Mich.

TANKS, METAL
Fuel Oil

Anthony Co., 47-22 Fifth St., Long Island City, N. Y.
Biggs Boiler Works Co., 2020 Bank St., Akron, O.
Bowser, S. F., & Co., Inc., 1302 E. Creighton Ave., Fort Wayne, Ind.
Butler Mfg. Co., 13th & Eastern Ave., Kansas City, Mo.
Caldwell, W. E., Co., Inc., 1970 Brook St., Louisville, Ky.
Case & Son Mfg. Co., W. A., 33 Main St., Buffalo, N. Y.
Chicago Boiler Co., 1965 Clybourn Ave., Chicago, Ill.
Connery Construction Co., 2nd & Luzerne Sts., Philadelphia, Pa.
Downingtown Iron Works, Downingtown, Pa.
Frank Heaters Inc., 150 Railroad Ave., Paterson, N. J.
Gifford-Wood Co., C. W., Hunt Div., Hudson, N. Y.
Gilbert & Barker Mfg. Co., Springfield, Mass.
Globe Machine & Stamping Co., 1250 W. 76th St., Cleveland, O.
Graver Tank & Mfg. Co., Inc., 4809 Todd Ave., East Chicago, Ill.
Hamburg Boiler Works Inc., Grand St., Hamburg, Pa.
Heilman Boiler Works, Allentown, Pa.
Kirk & Blum Mfg. Co., 2871 Spring Grove Ave., Cincinnati, O.
Koven & Brother, Inc., L. O., 154 Ogden Ave., Jersey City, N. J.
Lehigh Fan & Blower Co., Front & Linden Sts., Allentown, Pa.
Mojonnier Bros. Co., 4601 W. Ohio St., Chicago, Ill.
Morrison Bros., 24th & Elm Sts., Dubuque, Ia.
National Blow Pipe & Mfg. Co., Ltd., 724-38 Dryades St., New Orleans, La.
National Tank Co., Box 1588, Tulsa, Okla.
Pfaudler Co., 89 East Ave., Rochester, N. Y.
Porcupine Co., Bridgeport, Conn.
Quaker City Iron Works, 3407 Aramingo Ave., Philadelphia, Pa.
Richmond Engrg. Co., Inc., P. O. Box 514, Richmond, Va.
Sioux City Foundry & Boiler Co., E. 8th & Division Sts., Sioux City, Ia.
Southbridge Roofing Co. Inc., Hartwell and Chapin Sts., Southbridge, Mass.
Whitlock Mfg. Co., 100 South St., Hartford, Conn.

TANKS, METAL
Hot Water Expansion

American Radiator and Standard Sanitary Corp., Bessemer Bldg., Pittsburgh, Pa.
Beaton & Cadwell Mfg. Co., The, 185 Main St., New Britain, Conn.
Bell & Gossett Co., 3000 Wallace St., Chicago, Ill.
Bros Boiler & Mfg. Co., Wm., Nicollet Island, Minneapolis, Minn.
Carroll & Sons, P., 1406-10 Fairmount Ave., Philadelphia, Pa.
Case & Son Mfg. Co., W. A., 33 Main St., Buffalo, N. Y.
Chicago Boiler Co., 1965 Clybourn Ave., Chicago, Ill.
Emerson-Scheuring Tank Co., 2073 Martindale Ave., Indianapolis, Ind.
Enterprise Mfg. Co., 275 Third St., Cambridge, Mass.
Frank Heaters, Inc., 150 Railroad Ave., Paterson, N. J.
Frick Co., Waynesboro, Pa.
Graver Tank & Mfg. Co., Inc., 4809 Todd Ave., East Chicago, Ind.
International Boiler Works Co., The, East Stroudsburg, Pa.
Johnson Co., J. D., 139-143 N. 7th St., Philadelphia, Pa.
Kainer & Co., 761-771 Lexington St., Chicago, Ill.
Koven & Bro., L. O., 154 Ogden Ave., Jersey City, N. J.
Michigan Tank & Galvanizing Co., 14101 Prairie Ave., Detroit, Mich.
Morrison Bros., 24th & Elm Sts., Dubuque, Ia.
Muskegon Boiler Works, Clay Ave. & Eighth St., Muskegon, Mich.
National Steel Construction Co., 425 Frontenac St., Seattle, Wash.
National Tank Co., Box 1588, Tulsa, Okla.
Niles Steel Tank Co., Niles, Mich.
Pennsylvania Furnace & Iron Co., 316 Pine St., Warren, Pa.
Pennsylvania Range Boiler Co., 24th & Washington Ave., Philadelphia, Pa.
Porcupine Co., Bridgeport, Conn.
Quaker City Iron Works, Inc., 2705 E. Tioga St., Philadelphia, Pa.
Richmond Engineering Co., Inc., 7th and Hospital Sts., Richmond, Va.
Scaife & Sons Co., Wm. B., 26 Ann St., Oakmont, Pa.
Sioux City Foundry & Boiler Co., East 8th & Division Sts., Sioux City, Ia.
Stack Heater Co., The, 250 Stuart St., Boston, Mass.
Stover Steel Tank & Mfg. Co., 107 S. Hancock St., Freeport, Ill.
Taco Heaters, Inc., 342 Madison Ave., New York, N. Y.
Thrush & Co., H. A., 21 E. Riverside Dr., Peru, Ind.
Trageser Steam Copper Works, John, 5000 Grand Ave., Maspeth, L. I., N. Y.
Triplex Heating Specialty Co., Inc., 131 E. Canal St., Peru, Ind.
Walker & Pratt Mfg. Co., 31 Union St., Boston, Mass.
Wessels & Sons Co., D. D., 1625 Euclid Ave., E., Detroit, Mich.
Wheeling Steel Corp., Whee ing Steel Bldg., Wheeling, W. Va.
Wood Mfg. Co., John, 100 Washington St., Conshohocken, Pa.

TANKS, METAL
Hot Water Storage

Ames Iron Works, Div. of Pierce, Butler Radiator Corp., Oswego, N. Y.
Arcweld Mfg. Co., 3469 3rd Ave., W., Seattle, Wash.
Badger & Sons Co., E. B., 75 Pitts St., Boston, Mass.
Bass Foundry & Machine Co., 1602-1734 Hanna St., Ft. Wayne, Ind.
Bigelow Co., The, 92 River St., New Haven, Conn.
Biggs Boiler Works Co., 1107 Bank St., Akron, O.
Bowser & Co., S. F., 1302 E. Creighton Ave., Ft. Wayne, Ind.
Bros Boiler & Mfg. Co., Wm., Nicollet Island, Minneapolis, Minn.
Brownell Co., 300 N. Findlay St., Dayton, O.
Brunner Mfg. Co., 1821 Broad St., Utica, N. Y.
Burnham Boiler Corp., Main St., Irvington, N. Y.
Butler Mfg. Co., 13th & Eastern, Kansas City, Mo.
Caldwell Co., W. E., 2110 Brook St., Louisville, Ky.
Case & Son Mfg. Co., W. A., 33 Main St., Buffalo, N. Y.
Chicago Boiler Co., 1965 Clybourn Ave., Chicago, Ill.
Chicago Bridge & Iron Company, 3325 Michigan Ave., Chicago, Ill.
Chicago Metal Mfg. Co., 3724 S. Rockwell St., Chicago, Ill.
Dahlquist Mfg. Co., Inc., A, 2nd & West Third Sts., South Boston, Mass.
Devine Mfg. Co., J. P., 909 Shawnee Ave., Mt. Vernon, Ill.
Downingtown Iron Works, Wallace Ave., Downingtown, Pa.
Duriron Co. (Acid Proof), 416 N. Findlay St., Dayton, O.
Duro Co., 537-40 E. Monument Ave., Dayton, O.
Economy Pumps, Inc., 2522 W. Congress St., Chicago, Ill.
Farrar & Trefts, Inc., 9 Grimes St., Buffalo, N. Y.
Frank Heaters, Inc., 150 Railroad Ave., Paterson, N. J.
Frick Co., Waynesboro, Pa.
General Fittings Co., 123 Georgia Ave., Providence, R. I.
Gerstein & Cooper Co., 1-3 West Third St., South Boston, Mass.
Gilbert & Barker Mfg. Co., Springfield, Mass.
Graver Tank & Mfg. Co., 4809 Todd Ave., East Chicago, Ind.
Hamburg Boiler Works, Inc., Grand St., Hamburg, Pa.
Heilman Boiler Works, Allentown, Pa.
Hendrick Mfg. Co., 37 Dundaff St., Carbondale, Pa.
Herbert Boiler Co., Root & La Salle Sts., Chicago, Ill.
International Boiler Works Co., The, East Stroudsburg, Pa.
International Engineering Works, Box 71, Framingham, Mass.
Johnston Bros., Ferrysburg, Mich.
Kewanee Boiler Corp., Kewanee, Ill.
Kirk & Blum Mfg. Co., 2838-52 Spring Grove Ave., Cincinnati, O.
Koven & Bro., L. O., 154 Ogden Ave., Jersey City, N. J.
Lead Lined Iron Pipe Co. (Lead & Tin Lined), 1 Broadway, Wakefield, Mass.
Lehigh Fan & Blower Co., Front & Linden Sts., Allentown, Pa.
Lukens Steel Co., 308 S. First Ave., Coatesville, Pa.
Manitowoc Boiler Works, 16th & The River, Manitowoc, Wis.

Milwaukee Reliance Boiler Works, 2784 N. 32nd St., Milwaukee, Wis.
Morrison Bros., 24th & Elm Sts., Dubuque, Ia.
Murray Iron Works Co., 1106 Washington St., Burlington, Ia.
National Tank Co., Box 1588, Tulsa, Okla.
National Tube Co., United States Steel Corp. Subsidiary, Frick Bldg., Pittsburgh, Pa.
Northern Blower Co., 6409 Barberton Ave., Cleveland, O.
Patterson-Kelley Co., Inc., East Stroudsburg, Pa.
Pierce, Butler Radiator Corp., 701 Nichols Ave., Syracuse, N. Y.
Porcupine Co., Bridgeport, Conn.
Quaker City Iron Works, Allegheny & Tulip Sts., Philadelphia, Pa.
Richmond Engineering Co., 7th and Hospital Sts., Richmond, Va.
Roper Corp., George D., Blackhawk Ave., Rockford, Ill.
Rosebraugh Co., W. W., 680 S. 17th St., Salem, Ore.
Ross Heater & Mfg. Co., Inc., 1407 West Ave., Buffalo, N. Y.
Scaife & Sons Co., Wm. B., 26 Ann St., Oakmont, Pa.
Sims Co., 18th & Whitley Sts., Erie, Pa.
Sinker-Davis Co., 230 S. Missouri, St., Indianapolis, Ind.
Thrush & Co., 21 E. Riverside Dr., Peru, Ind.
Titusville Boiler Div., The Struthers-Wells-Titusville Corp., Titusville, Pa.
Trageser Steam Copper Works, John, 5000 Grand St., Maspeth, N. Y.
Troop Water Heater Co., 2516-2526 Jane St., Pittsburgh, Pa.
Union Iron Works, 1500 Cascade St., Erie, Pa.
United States Radiator Corp., 1056 National Bank Bldg., Detroit, Mich.
Western Blower Co., 1800 Airport Seattle, Wash.
Wheeling Steel Corp., Wheeling Steel Corp., Bldg., Wheeling, W. Va.
Whitehead Metal Products Co. of New York, 303 W. 10th St., New York, N. Y.
Whitlock Mfg. Co., 100 South St., Hartford, Conn.
Wickes Boiler Co., 502 N. Water St., Saginaw, Mich.

TEMPERATURE CONTROLS

(See Controls, Temperature)

TEMPERATURE CONTROL SYSTEMS

(See Systems, Automatic Temperature Control)

TEMPERATURE GAGES

(See Gages, Temperature)

TEMPERATURE RECORDERS

(See Recorders, Temperature and Recorders, Temperature and Humidity)

THERMOMETERS, INDICATING

Duct

Bristol Co., Platts Bridge, Waterbury, Conn.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., 4534 Wayne Ave., Philadelphia, Pa.
Defender Automatic Regulator Co., 308 S. 8th St., St. Louis, Mo.
Electric Auto-Lite Co., Moto Meter Gauge & Equipment Div., Caledonia & Gillette Sts., La Crosse, Wis.
Fee & Stemwedel, Inc., 4949 N. Pulaski Rd., Chicago, Ill.
H-B Instrument Co., 2518 N. Broad St., Philadelphia, Pa.
Illinois Testing Laboratories, 419 N. La Salle St., Chicago, Ill.
Manning, Maxwell & Moore, Inc., 11 Elias St., Bridgeport, Conn.
Marsh, Corp., Jas. P., 2089 Southport Ave., Chicago, Ill.
Martocello & Co., Joseph A., 229 N. 13th St., Philadelphia, Pa.
Mason-Neilan Regulator Co., 1190 Adams St., Boston, Mass.
Minneapolis-Honeywell Regulator Co., 2701 Fourth Ave., South, Minneapolis, Minn.
Moeller Instrument Co., 132nd St. & 89th Ave., Richmond Hill, N. Y.
Powers Regulator Co., 2720 Greenview Ave., Chicago, Ill.
Precision Thermometer & Instrument Co., 1434 Brandywine St., Philadelphia, Pa.
Preferred Utilities Mfg. Corp., 33 W. 60th St., New York, N. Y.
Rochester Mfg. Co., Inc., Rochester, N. Y.
Sarco Co., Inc., 183 Madison Ave., New York, N. Y.
Scientific Instrument Co., 531-35 W. Larned, Detroit, Mich.
Standard Thermometer, Inc., 65 Shirley St., Boston, Mass.
Tagliabue Mfg. Co., C. J., 540 Park Ave., Brooklyn, N. Y.
Taylor Instrument Companies, 95 Ames St., Rochester, N. Y.
Trerice Co., H. O., 1420 W. Lafayette Blvd., Detroit, Mich.
United States Gauge Co., 44 Beaver St., New York, N. Y.
Weston Electrical Instrument Corp., 614 Frelinghuysen Ave., Newark, N. J.
Wheelco Instruments Co., 1933 S. Halsted St., Chicago, Ill.
Wilbin Instrument Corp., 40 E. 34th St., New York, N. Y.

THERMOMETERS, INDICATING

Immersion

American Thermometer Co., 2907 Clark Ave., St. Louis, Mo.
Bristol Co., Platts Bridge, Waterbury, Conn.
Defender Automatic Regulator Co., 308 S. 8th St., St. Louis, Mo.
Electric Auto-Lite Co., Moto Meter Gauge & Equipment Div., Caledonia & Gillette Sts., La Crosse, Wis.
Foxboro Co., 106 Neponset Ave., Foxboro, Mass.
Friez & Sons, Inc., Julien P., 4 N. Central Ave., Baltimore, Md.
General Scientific Equipment Co., 2735 N. Broad St., Philadelphia, Pa.
H-B Instrument Co., 2518 N. Broad St., Philadelphia, Pa.
Johnson Service Co., 507 E. Michigan St., Milwaukee, Wis.
Manning, Maxwell & Moore, Inc., 11 Elias St., Bridgeport, Conn.
Marsh, Corp., Jas. P., 2089 Southport Ave., Chicago, Ill.
Mason-Neilan Regulator Co., 1190 Adams St., Boston, Mass.
Moeller Instrument Co., 132nd St. & 89th Ave., Richmond Hill, N. Y.
National Gauge Corp., 300 Pacific St., Brooklyn, N. Y.
Palmer Co., 2501 Norwood Ave., Cincinnati (Norwood), O.
Philadelphia Thermometer Co., 915 Filbert St., Philadelphia, Pa.
Powers Regulator Co., The, 2720 Greenview Ave., Chicago, Ill.
Precision Thermometer & Instrument Co., 1434 Brandywine St., Philadelphia, Pa.
Preferred Utilities Mfg. Corp., 33 W. 60th St., New York, N. Y.
Pyrometer Instrument Co., 103 Lafayette St., New York, N. Y.
Rochester Mfg. Co., Inc., Rochester, N. Y.
Scientific Instrument Co., 531-35 W. Larned, Detroit, Mich.
Standard Thermometer, Inc., 65 Shirley St., Boston, Mass.
Taco Heaters, Inc., 342 Madison Ave., New York, N. Y.
Tagliabue Mfg. Co., C. J., 540 Park Ave., Brooklyn, N. Y.
Taylor Instrument Companies, 95 Ames St., Rochester, N. Y.
Thrush & Co., H. A., 21 E. Riverside Dr., Peru, Ind.
Trerice Co., H. O., 1420 W. Lafayette Blvd., Detroit, Mich.
United States Gauge Co., 44 Beaver St., New York, N. Y.
Wheelco Instruments Co., 1933 S. Halsted St., Chicago, Ill.

THERMOMETERS, INDICATING

Room Mounting

American Thermometer Co., 2907 Clark Ave., St. Louis, Mo.
Bristol Co., Platts Bridge, Waterbury, Conn.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., 4534 Wayne Ave., Philadelphia, Pa.
Electric Auto-Lite Co., Moto Meter Gauge & Equipment Div., Caledonia & Gillette Sts., La Crosse, Wis.
Engelhard Inc., Charles, 90 Chestnut St., Newark, N. J.
Foxboro Co., 106 Neponset Ave., Foxboro, Mass.
G. M. Mfg. Co., P. O. Box 151, Madison Square Sta., New York, N. Y.
General Scientific Equipment Co., 2735 N. Broad St., Philadelphia.
H-B Instrument Co., 2518 N. Broad St., Philadelphia, Pa.
Hill, E. Vernon, 6826 W. Highland Ave., Chicago, Ill.
Illinois Testing Laboratories, Inc., 419 N. La Salle St., Chicago, Ill.
Leeds & Northrup Co., 4970 Stenton Ave., Philadelphia, Pa.
Manning, Maxwell & Moore, Inc., American Schaeffer & Budenberg Instrument Div., 11 Elias St., Bridgeport, Conn.
Marsh, Corp., Jas. P., 2089 Southport Ave., Chicago, Ill.
Martocello & Co., Jos. A., 229 N. 13th St., Philadelphia, Pa.
Moeller Instrument Co., 132nd St., & 89th Ave., Richmond Hill, N. Y.
Palmer Co., 2501 Norwood Ave., Cincinnati (Norwood), O.
Parsons, John R., 151 E. 19th St., New York, N. Y. (Effective Temperature Indicator)
Philadelphia Thermometer Co., 915 Filbert St., Philadelphia, Pa.
Precision Thermometer & Instrument Co., 1434 Brandywine St., Philadelphia, Pa.
Rochester Mfg. Co., Inc., Rochester, N. Y.
Scientific Instrument Co., 531-35 W. Larned, Detroit, Mich.
Standard Thermometer, Inc., 65 Shirley St., Boston, Mass.
Tagliabue Mfg. Co., C. J., 540 Park Ave., Brooklyn, N. Y.
Taylor Instrument Companies, 95 Ames St., Rochester, N. Y.
Thwing-Albert Instrument Co., 3339 Lancaster Ave., Philadelphia, Pa.
Trerice Co., H. O., 1420 W. Lafayette Blvd., Detroit, Mich.
United States Gauge Co., 44 Beaver St., New York, N. Y.
Wheelco Instruments Co., 1933 S. Halsted St., Chicago, Ill.

THERMOMETERS, KATA

G. M. Mfg. Co., P. O. Box 151, Madison Square Sta., New York, N. Y.
Palmer Co., 2501 Norwood Ave., Cincinnati (Norwood), O.
Precision Thermometer & Instrument Co., 1434 Brandywine St., Philadelphia. Pa.
Scientific Instrument Co., 531-35 W. Larned, Detroit, Mich.

THERMOSTATIC BELLOWS

(See Bellows, Thermostatic)

THERMOSTATIC BI-METAL

(See Bi-Metal, Thermostatic)

THERMOSTATS

Air Duct

Au-Temp-Co Corp., 1 Park Ave., New York, N. Y.
Barber-Colman Co., 225 Loomis St., Rockford, Ill.
Bristol Co., Platts Bridge, Waterbury, Conn.
Burling Instrument Co., 4 Belmont Ave., Newark, N. J.
Defender Automatic Regulator Co., 308 S. 8th St., St. Louis, Mo.
Cook Electric Co., 2700 Southport Ave., Chicago, Ill.
D & M Mfg. Co., 51 Lincoln Ave., Midland Park, N. J.
Detroit Lubricator Co., 5900 Trumbull Ave., Detroit, Mich.
Edison, Inc., Thomas A., Edison Electric Controls Div., Lakeside Ave., West Orange, N. J.
Foxboro Co., 106 Neponset Ave., Foxboro, Mass.
Friez & Sons, Julien P., 4 N. Central Ave., Baltimore, Md.
General Controls Co., 700 W. Ivy St., Glendale, Cal.
Gilbert & Barker Mfg. Co., Springfield, Mass.
Hart Mfg. Co., Hamilton St., Hartford, Conn.
Jefferson Electric Co., 25th & Madison St., Bellwood, Ill.
Johnson Service Co., 507 E. Michigan St., Milwaukee, Wis.
Leslie Co., Valley Brook & Grant Aves., Lyndhurst, N. J.
Minneapolis-Honeywell Regulator Co., 2701 Fourth Ave., South, Minneapolis, Minn.
Penn Electric Switch Co., Box 555, Goshen, Ind.
Perfex Corp. (Controls Div.), 500 W. Oklahoma Ave., Milwaukee, Wis.
Philadelphia Thermometer Co., 915 Filbert St., Philadelphia, Pa.
Powers Regulator Co., 2720 Greenview Ave., Chicago, Ill.
Sarco Co., Inc., 183 Madison Ave., New York, N. Y.
Sheer Co., H. M., Second & Hampshire Sts., Quincy, Ill.
Spencer Thermostat Co., 43 Forest St., Attleboro, Mass.
Standard Thermometer, Inc., 65 Shirley St., Boston, Mass.
Tagliabue Mfg. Co., C. J., 540 Park Ave., Brooklyn, N. Y.
Tallmadge & Co., Webster, 225 N. 18th St., East Orange, N. J.
Taylor Instrument Companies, 95 Ames St., Rochester, N. Y.
United Electric Controls Co., 69 A St., Boston, Mass.
Vapor Car Heating Co., Inc., 80 E. Jackson Blvd., Chicago, Ill.
White-Rodgers Electric Co., 1289 Cass Ave., St. Louis, Mo.

THERMOSTATS

Effective Temperature

Barber-Colman Co., 225 Loomis St., Rockford, Ill.
D & M Mfg. Co., 51 Lincoln Ave., Midland Park, N. J.
Defender Automatic Regulator Co., 308 S. 8th St., St. Louis, Mo.
Friez & Sons, Julien P., 4 N. Central Ave., Baltimore, Md.
Gilbert & Barker Mfg. Co., Springfield, Mass.
Illinois Engineering Co., 2035 S. Racine Ave., Chicago, Ill.
Johnson Service Co., 507 E. Michigan St., Milwaukee, Wis.
Minneapolis-Honeywell Regulator Co., 2701 Fourth Ave., South, Minneapolis, Minn.
Powers Regulator Co., 2720 Greenview Ave., Chicago, Ill.
Taylor Instrument Companies, 95 Ames St., Rochester, N. Y.

THERMOSTATS

Liquid Immersion

Acme Electric Heating Co., Inc., 1217 Washington St., Boston, Mass.
Au-Temp-Co Corp., 1 Park Ave., New York, N. Y.
Barber-Colman Co., 225 Loomis St., Rockford, Ill.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., 4534 Wayne Ave., Philadelphia, Pa.
Burling Instrument Co., 4 Belmont Ave., Newark, N. J.
Cooper Co., Clark, 159 Jefferson St., Philadelphia, Pa.

D & M Mfg. Co., 51 Lincoln Ave., Midland Park, N. J.
d'Este Co., Julian, 6 Spice St., Charlestown, Mass.
Detroit Lubricator Co., 5900 Trumbull Ave., Detroit, Mich.
Dunn, Inc., Struthers, 1332 Cherry St., Philadelphia, Pa.
Edison, Inc., Thomas A., Edison Electric Controls Div., Lakeside Ave., West Orange, N. J.
Foxboro Co., 106 Neponset Ave., Foxboro, Mass.
Friez & Sons, Julien P., 4 N. Central Ave., Baltimore, Md.
General Controls Co., 700 W. Ivy St., Glendale, Cal.
Gilbert & Barker Mfg. Co., Springfield, Mass.
H-B Instrument Co., 2518 N. Broad St., Philadelphia, Pa.
Hart Mfg. Co., Hamilton St., Hartford, Conn.
Hotstream Heater Co., The, 8007 Grand Ave., Cleveland, O.
Jefferson Electric Co., 25th & Madison St., Bellwood, Ill.
Johnson Service Co., 507 E. Michigan St., Milwaukee, Wis.
Leslie Co., Valley Brook & Grant Aves., Lyndhurst, N. J.
Mercoid Corp., The, 4201 Belmont Ave., Chicago, Ill.
Minneapolis-Honeywell Regulator Co., 2701 Fourth Ave., South, Minneapolis, Minn.
Penn Electric Switch Co., Box 556, Goshen, Ind.
Perfex Corp. (Controls Div.), 500 W. Oklahoma Ave., Milwaukee, Wis.
Pioneer Heat Regulator Div., Master Electric Co., The, 100 Davis Ave., Dayton, O.
Powers Regulator Co., 2720 Greenview Ave., Chicago, Ill.
Precision Thermometer & Instrument Co., 1434 Brandywine St., Philadelphia, Pa.
Sarco Co., Inc., 183 Madison Ave., New York, N. Y.
Spencer Thermostat Co., 43 Forest St., Attleboro, Mass.
Tagliabue Mfg. Co., C. J., 540 Park Ave., Brooklyn, N. Y.
Taylor Instrument Companies. 95 Ames St., Rochester, N. Y.
Thwing-Albert Instrument Co., 3339 Lancaster Ave., Philadelphia, Pa.
United Electric Controls Co., 69 A St., Boston, Mass.
Warren Electric Appliance Co., Warren Bank & Trust Co., Bldg., Warren, Pa.
White-Rodgers Electric Co., 1289 Cass Ave., St. Louis, Mo.
Wilcolator Co., 17 Nevada St., Newark, N. J.

THERMOSTATS
Remotely Adjusted

Barber-Colman Co., 225 Loomis St., Rockford, Ill.
Dunham Co., C. A., 450 E. Ohio St., Chicago, Ill.
Johnson Service Co., 507 E. Michigan St., Milwaukee, Wis.
Leslie Co., Valley Brook & Grant Aves., Lyndhurst, N. J.
Spencer Thermostat Co., 34 Forest St., Attleboro, Mass.
White-Rodgers Electric Co., 1289 Cass Ave., St. Louis, Mo.

THERMOSTATS
Room or Wall

Acme Electric Heating Co., Inc., 1217 Washington St., Boston, Mass.
Au-Temp-Co Corp., 1 Park Ave., New York, N. Y.
Automatic Products Co., 2450 N. 32nd St., Milwaukee, Wis.
Baker Ice Machine Co., Inc., 1508 Evans St., Omaha, Neb.
Barber-Colman Co., 225 Loomis St., Rockford, Ill.
Bell & Gossett Co., 3000 Wallace St., Chicago, Ill.
Bristol Co., Platts Bridge, Waterbury, Conn.
Cook Electric Co., 2700 Southport Ave., Chicago, Ill.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Crise Elec. Mfg. Co., 14-16 E. Ohio Ave., Mt. Vernon, O.
Detroit Lubricator Co., 5900 Trumbull Ave., Detroit, Mich.
Dunham Co., C. A., 450 E. Ohio St., Chicago, Ill.
Friez & Sons, Julien P., 4 N. Central Ave., Baltimore, Md.
Fulton Sylphon Co., Knoxville, Tenn.
General Controls Co., 700 W. Ivy St., Glendale, Cal.
General Electric Co., Air Conditioning and Commercial Refrigeration Dept., 5 Lawrence St., Bloomfield, N. J.
Gilbert & Barker Mfg. Co., Springfield, Mass.
Gleason-Avery, Inc., 27 Clark St., Auburn, N. Y.
Illinois Engineering Co., 2035 S. Racine Ave., Chicago, Ill.
Jefferson Electric Co., 25th & Madison St., Bellwood, Ill.
Johnson Service Co., 507 E. Michigan St., Milwaukee, Wis.
Magnet Switch Co., 356 W. Huron St., Chicago, Ill.
McAlear Mfg Co., 1901-1909 S. Western Ave., Chicago, Ill.
McCorkle Co., D. H., 6th & Bankcroft Way, Berkeley, Cal.
Mercoid Corp., The, 4201 Belmont Ave., Chicago, Ill.
Minneapolis-Honeywell Regulator Co., 2701 Fourth Ave., South, Minneapolis, Minn.
Penn Electric Switch Co., Box 556, Goshen, Ind.
Perfex Corp. (Controls Div.), 500 W. Oklahoma Ave., Milwaukee, Wis.
Pioneer Heat Regulator Div., Master Electric Co., The, 100 Davis Ave., Dayton, O.
Powers Regulator Co., 2720 Greenview Ave., Chicago, Ill.
Russell Electric Co., 348 W. Huron St., Chicago, Ill.
Sarco Co., Inc., 183 Madison Ave., New York, N. Y.
Sheer Co., H. M., Second & Hampshire Sts., Quincy, Ill.
Spencer Thermostat Co., 43 Forest St., Attleboro, Mass.
Standard Thermometer, Inc, 65 Shirley St., Boston, Mass.
Tallmadge & Co., Webster, 255 N. 18th St., East Orange, N. J
Taylor Instrument Companies, 95 Ames St, Rochester, N. Y.
Thrush & Co., H. A., 21 E. Riverside Dr., Peru, Ind.
Triplex Heating Specialty Co., Inc., 131 E. Canal St., Peru, Ind.
United Electric Controls Co., 69 A St., Boston, Mass.
Vapor Car Heating Co., Inc., 80 E. Jackson Blvd., Chicago, Ill.
White Mfg. Co., 2362 University Ave., St. Paul, Minn.
White-Rodgers Electric Co., 1289 Cass Ave., St. Louis, Mo.

THERMOSTATS
Seasonal Change-Over

Barber-Colman Co., 225 Loomis St., Rockford, Ill.
Friez & Sons, Julien P., 4 N. Central Ave., Baltimore, Md.
Johnson Service Co., 507 E. Michigan St., Milwaukee, Wis.
Spencer Thermostat Co., 34 Forest St., Attleboro, Mass.

THERMOSTATS
Surface

Au-Temp-Co Corp., 1 Park Ave., New York, N. Y.
Barber-Colman Co., 225 Loomis St., Rockford, Ill.
Bristol Co., Platts Bridge, Waterbury, Conn.
Detroit Lubricator Co., 5900 Trumbull Ave., Detroit, Mich.
Dunn, Inc., Struthers, 1332 Cherry St., Philadelphia, Pa.
Edison, Inc., Thomas A., Edison Electric Controls Div., Lakeside Ave., West Orange, N. J.
Foxboro Co., 106 Neponset Ave., Foxboro, Mass.
Friez & Sons, Julien P., 4 N. Central Ave., Baltimore, Md.
General Controls Co., 700 W. Ivy St., Glendale, Cal.
Gilbert & Barker Mfg. Co., Springfield, Mass.
Hart Mfg. Co., Hamilton St., Hartford, Conn.
Jefferson Electric Co., 25th & Madison St., Bellwood, Ill.
Mercoid Corp., The, 4201 Belmont Ave., Chicago, Ill.
Minneapolis-Honeywell Regulator Co., 2701 Fourth Ave., South, Minneapolis, Minn.
Penn Electric Switch Co., Box 556, Goshen, Ind.
Perfex Corp. (Controls Div.), 500 W. Oklahoma Ave., Milwaukee, Wis.
Pioneer Heat Regulator Div., Master Electric Co., The, 100 Davis Ave., Dayton, O.
Powers Regulator Co., 2720 Greenview Ave., Chicago, Ill.
Ranco, Inc., 601 W. 5th Ave., Columbus, O.
Sarco Co., Inc., 183 Madison Ave., New York, N. Y.
Sheer Co., H. M., Second & Hampshire Sts., Quincy, Ill.
Spencer Thermostat Co., 43 Forest St., Attleboro, Mass.
Taylor Instrument Companies, 95 Ames St., Rochester, N. Y.
United Electric Controls Co., 69 A St., Boston, Mass.
White-Rodgers Electric Co., 1289 Cass Ave., St. Louis, Mo.

THERMOSTATS
Two Temperature

Au-Temp-Co Corp., 1 Park Ave., New York, N. Y.
Barber-Colman Co., 225 Loomis St., Rockford, Ill.
Burling Instrument Co., 4 Belmont Ave., Newark, N. Y.
Cooper Co., Clark, 159 Jefferson St., Philadelphia, Pa.
Detroit Lubricator Co., 5900 Trumbull Ave., Detroit, Mich.
Friez & Sons, Julien P., 4 N. Central Ave., Baltimore, Md.
General Controls Co., 700 W. Ivy St., Glendale, Cal.
General Electric Co., Air Conditioning and Commercial Refrigeration Dept., 5 Lawrence St., Bloomfield, N. J.
Gleason-Avery, Inc., 27 Clark St., Auburn, N. Y.
H-B Instrument Co., 2518 N. Broad St., Philadelphia, Pa.
Herske & Timmis, Inc., 33 W. 60th St., New York, N. Y.
Illinois Engineering Co., 2035 S. Racine Ave., Chicago, Ill.
Jefferson Electric Co., 25th & Madison St., Bellwood, Ill.
Johnson Service Co., 507 E. Michigan St., Milwaukee, Wis.
McAlear Mfg. Co., 1901-1909 S. Western Ave., Chicago, Ill.
Mercoid Corp., The, 4201 Belmont Ave., Chicago, Ill.
Minneapolis-Honeywell Regulator Co., 2701 Fourth Ave., South, Minneapolis, Minn.
Penn Electric Switch Co., Box 556, Goshen, Ind.
Perfex Corp. (Controls Div.), 500 W. Oklahoma Ave., Milwaukee, Wis.
Pioneer Heat Regulator Div., Master Electric Co., The, 100 Davis Ave., Dayton, O.
Powers Regulator Co., 2720 Greenview Ave., Chicago, Ill.
Precision Thermometer & Instrument Co., 1434 Brandywine St., Philadelphia, Pa.
Ranco, Inc., 601 W. 5th Ave., Columbus, O.
Sarco Co., Inc., 183 Madison Ave., New York, N. Y.
Sheer Co., H. M., Second & Hampshire Sts., Quincy, Ill.
Tagliabue Mfg. Co., C. J., 540 Park Ave., Brooklyn, N. Y.
Taylor Instrument Companies, 95 Ames St., Rochester, N. Y.
United Electric Controls Co., 69 A St., Boston, Mass.
Vapor Car Heating Co., Inc., 80 E. Jackson Blvd., Chicago, Ill.
White-Rodgers Electric Co., 1289 Cass Ave., St. Louis, Mo.

THERMOSTATS
Weather Compensating

(See Controls, Weather Compensated)

THROWAWAY FILTERS

(See Filters, Air, Unit)

TIME SWITCHES

(See Switches, Time)

TOWERS, COOLING

Natural Draft (N), Mechanical Draft (M)

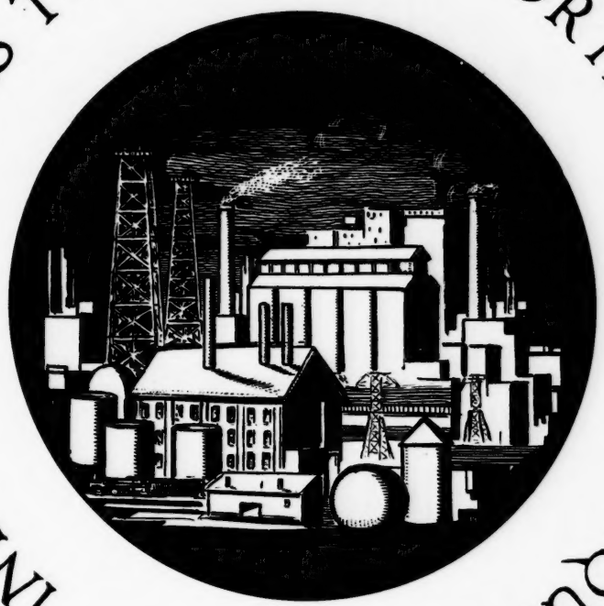
American Cooling Tower Co., 2710 McGee St., Kansas City, Mo.
Baker Ice Machine Co. Inc., 1508 Evans St., Omaha, Neb.
Binks Mfg. Co., 3114-40 Carroll Ave., Chicago, Ill. (N) (M)
Bros Boiler & Mfg. Co., Wm., Nicollet Island, Minneapolis, Minn.
Burhorn Co., Edwin, 1 Newark St., Hoboken, N. J. (N) (M)
Fluor Corp., Ltd., The, 909 E. 59th St., Los Angeles, Cal. (N) (M)
Foster Wheeler Corp., 165 Broadway, New York, N. Y. (N) (M)
Hess Warming & Ventilating Co., 1211 S. Western Ave., Chicago, Ill. (M)
Lilie-Hoffmann Cooling Towers, Inc., 4239 Duncan Ave., St. Louis, Mo. (N) (M)
Marley Co., 3001 Fairfax Rd., Kansas City, Mo. (N) (M)
Marlo Coil Co., 6135 Manchester Ave., St. Louis, Mo. (M)
Motor Equipment Co., 214 W. Douglas St., Wichita, Kan. (M)
Palmer Mfg. Corp., Phoenix, Ariz. (N)
Penn Cooling Tower Wks., 1337 Nixon St., Pittsburgh, Pa. (N) (M)
Pennsylvania Engineering Wks., 526 S. Jefferson St., New Castle, Pa. (N) (M)
Phillips Cooling Tower Co., Inc., 15 John St., New York, N. Y.
Propellair, Inc., 1345 Lagonda Ave., Springfield, O. (M)
Research Corp., Chrysler Bldg., New York, N. Y. (M)
Ross Sprinkler Co., 34 Roberts St., Pasadena, Cal.
Schubert-Christy Corp., Box 166, Affton Station, St. Louis, Mo. (N)
Star Radiator Co., 649 Ceres Ave., Los Angeles, Cal. (N) (M)
Stewart Ice Machine Co., 1046 E. 22nd St., Los Angeles, Cal. (N)
Sturtevant Co., B. F., Damon St., Hyde Park, Boston, Mass.
Tippett & Wood, Morris and Warren Sts., Phillipsburg, N. J. (N)
Water Cooling Tower Co., 605 W. Washington Blvd., Chicago, Ill. (N) (M)
Wheeler Mfg. Co., C. H., 19th, Lehigh & Sedgley Aves., Philadelphia, Pa. (M)

TRAPS, STEAM

Mechanical (M) Thermostatic (T)

American District Steam Co., Bryant St., North Tonawanda, N. Y. (M) (T)
Anderson Co., V. D., The, 1949 W. 96th St., Cleveland, O. (M)
Armstrong Machine Wks., 874 Maple St., Three Rivers, Mich. (M)
Barnes & Jones, Inc., 128 Brookside Ave., Jamaica Plain, Boston, Mass. (M) (T)
Bishop & Babcock Mfg. Co., 4901 Hamilton Ave., Cleveland, O. (M) (T)
Boylston Steam Specialty Co., 116-122 W. Illinois St., Chicago, Ill. (M)
Bundy Steam Trap Co., Nashua, N. H. (M)
Burrows Mfg. Co., F. A., 1638 E. Market St., York, Pa. (M)
Capitol Brass Div., Bohn Aluminum & Brass Corp., 2306 Franklin St., Detroit, Mich. (T)
Cash Universal Regulator Co., Marshalltown, Ia. (M)
Cashin Co., W. D., 69 A St., Boston, Mass. (M) (T)
Clifford Mfg. Co., 564 E. First St., Boston, Mass. (T)
Cochrane Corp., 3161 N. 17th St., Philadelphia, Pa. (M)
Coe Mfg. Co., Bank St., Painesville, O. (M)
Crane Co., 836 S. Michigan Ave., Chicago, Ill. (M)

INDUSTRY LOOKS TO MERCOID FOR ITS CONTROL REQUIREMENTS



IT HAS BEEN PUBLICLY STATED THAT THERE IS SCARCELY AN INDUSTRY IN THE COUNTRY THAT IS NOT USING A MERCOID CONTROL SOMEWHERE

Years of experience in the varied applications of Mercoid Control instruments have demonstrated what can be expected of a high grade product. * There is an ever widening demand from front rank engineers in every field of activity for the qualities of positive performance, long life and general dependability inherent in every Mercoid Control. * Mercoid has served the automatic heating trade since its pioneering days and has kept abreast with its progressive demands. Among other developments is the "Visaflame"—a light operated safety control system. * Engineering inquiries on Mercoid Control applications are invited and promptly handled. Catalog with complete description of the Mercoid line sent on request.

The Mercoid Corporation • 4201 Belmont Ave. • Chicago, Ill.

EQUIPPED EXCLUSIVELY WITH SEALED MERCURY CONTACT CORROSION-PROOF SWITCHES

Mercoid Controls illustrated: Type DA-31, for steam boilers; Type THV Stok-A-Timer, a unique heat motor stoker control; Type H Sensatherm, the thermostat of beauty and mechanical perfection; Type JMl, safety and ignition control; Type M-80, combination warm air fan and limit control.

Cryer Trap & Valve Co., Inc., 366 Madison Ave., New York, N. Y. (M) (T)
Davis Regulator Co., 2546 S. Washtenaw Ave., Chicago, Ill. (M)
Dunham Co., C. A., 450 E. Ohio St., Chicago, Ill. (T)
Ellis Drier Co., 2444 N. Crawford Ave., Chicago, Ill. (M)
Fisher Governor Co., 201 S. First Ave., Marshalltown, Ia. (M)
Haines & Co., William S., 12th & Buttonwood Sts., Philadelphia, Pa., (M) (T)
Healy Ruff Co, 765 Hampden Ave., St. Paul, Minn. (M)
Hoffman Specialty Co., Inc., Waterbury Natl. Bank Bldg., Waterbury, Conn. (M) (T)
Huyette Co., Inc., Paul B., 401 N. Broad St., Philadelphia, Pa. (M) (T)
Illinois Engineering Co., 2035 S. Racine Ave., Chicago, Ill. (M) (T)
Johnson Corp., 830 Wood St., Three Rivers, Mich. (M)
Justus Steam Trap Co., Napanoch, N. Y. (M)
Kaye & McDonald, Inc., 92 Franklin St., West Orange, N. J. (M)
Keckley Co., O. C., 400 W. Madison St., Chicago, Ill. (M)
Kieley & Mueller, Inc., 40 W. 13th St., New York, N. Y. (M)
Klipfel Mfg. Co., 2651 W. Harrison St., Chicago, Ill. (M)
Lytton Mfg. Co., 102 First Ave., Franklin, Va. (M)
Marsh Corp., Jas. P., 2073 Southport Ave., Chicago, Ill. (M) (T)
McAlear Mfg. Co., 1901-1909 S. Western Ave., Chicago, Ill. (M) (T)
McAuley Trap Co., 405 Penn Ave., Pittsburgh, Pa. (M)
Milwaukee Valve Co., S. Burrell St., at E. Hayes Ave., Milwaukee, Wis. (M) (T)
Monash-Younker Co., 1315 W. Congress St., Chicago, Ill. (M) (T)
Morehead Mfg. Co., 4895 Grand River Ave., Detroit, Mich. (M)
Mouat Vapor Heating Co., The, 1246-1254 W. 4th St., Cleveland, O. (M) (T)
Mueller Steam Specialty Co., Inc., 40-20 22nd St., Long Island City, N. Y. (M)
Nason Co., 1050 Mt. Elliott Ave., Detroit, Mich. (M)
Nicholson & Co., W. H., 12 Oregon St., Wilkes-Barre, Pa. (M) (T)
Pierce, Butler Radiator Corp., 701 Nichols Ave., Syracuse, N. Y. (T)
Powers Regulator Co., 2720 Greenview Ave., Chicago, Ill. (T)
Reading-Pratt & Cady Div., American Chain & Cable Co., Inc., Reading, Pa. (M)
Sarco Co., Inc., 183 Madison Ave., New York, N. Y. (M) (T)
Schaub Engineering Co., Fred H., 325 W. Huron St., Chicago, Ill. (M)
Simplex Heating Specialty Co., Inc., Pettyjohn Bldg., Lynchburg, Va. (T)
Squires Co., C. E., E. 40th St. & Kelley Ave., Cleveland, O. (M)
Star Radiator Co., 649 Ceres Ave., Los Angeles, Cal., (M)
Steamaire Co., Cincinnati, O. (M) (T)
Sterling Engineering & Mfg. Corp., 117 Business St., Hyde Park, Mass. (M)
Sterling, Inc., 3738 N. Holton St., Milwaukee, Wis. (M) (T)
Stickle Steam Specialties Co., 2215 Valley Ave., Indianapolis, Ind. (M) (T)
Strong, Carlisle & Hammond Co., The, 1392 W. Third St., Cleveland, O. (M) (T)
Swartwout Co., 18511 Euclid Ave., Cleveland, O. (M) (T)
Tagliabue Mfg. Co., C. J., 540 Park Ave., Brooklyn, N. Y. (T)
Templeton Bros., 189 Belgrade Ave., Roslindale Station, Boston, Mass. (Return) (M)
Trane Co., The, La Crosse, Wis. (T)
Trerice Co., H. O., 1420 W. Lafayette Blvd., Detroit, Mich. (M) (T)
Vapor Car Heating Co., Inc., 80 E. Jackson Blvd., Chicago, Ill. (M) (T)
Vapor Specialty Co., 101 W. 42nd St., New York, N. Y. (M) (T)
Watson & McDaniel Co., 440 N. Marshall, Philadelphia, Pa. (M)
Webster & Co., Warren, 17th & Federal Sts., Camden, N. J. (M) (T)
Williams Gauge Co., 1620 Pennsylvania Ave., S. S., Pittsburgh, Pa. (M)
Wright-Austin Co., 315 W. Woodbridge St., Detroit, Mich. (M)
Yarnall-Waring Co., Chestnut Hill, Philadelphia, Pa. (M)

TUBING, ALUMINUM

Aluminum Co. of America, 801 Gulf Bldg., Pittsburgh, Pa.

TUBING, BRASS & COPPER

American Brass Co., 414 Meadow St., Waterbury, Conn.
American Radiator & Standard Sanitary Corp., Bessemer Bldg., Pittsburgh, Pa.
Bridgeport Brass Co., E. Main St., Bridgeport, Conn.
Chase Brass & Copper Co., 236 Grand St., Waterbury, Conn.
Hussey & Co., C. G., 2850 Second Ave., Pittsburgh, Pa.
Imperial Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.
Mueller Brass Co., Lapeer Ave., Port Huron, Mich.
Newman Brothers, Inc., 666 W. Fourth St., Cincinnati, O.
Parker Appliance Co., The, 17325 Euclid Ave., Cleveland, O.
Phelps Dodge Copper Products Corp., British American Tube Div., 40 Wall St., New York, N. Y.
Revere Copper and Brass Incorporated, 230 Park Ave., New York, N. Y.
Roberts Tube Works, 2500 Military Ave., Detroit, Mich.
Scovill Mfg. Co., Waterville Div., Waterville, Conn.
Streamline Pipe & Fittings Div., Mueller Brass Co., 1925 Lapeer Ave., Port Huron, Mich.
United States Brass & Copper Co., Hyde Park Ave., Hyde Park, Boston, Mass.
Wolverine Tube Co., 1455 Central Ave., Detroit, Mich.

TUBING, FINNED
All Metals

Aerofin Corp., 410 S. Geddes St., Syracuse, N. Y.
Airtherm Mfg. Co., 700 S. Spring Ave., St. Louis, Mo.
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
Bush Mfg. Co., 100 Wellington St., Hartford, Conn.
Chase Brass & Copper Co., 236 Grand St., Waterbury, Conn.
Fedders Mfg. Co., Inc., 57 Tonawanda St., Buffalo, N. Y.
G. & O. Mfg. Co., 138 Winchester Ave., New Haven, Conn.
Industrial Mfg. & Engineering Co., 3845 N. Ravenswood Ave., Chicago, Ill.
Kramer Trenton Co., 626 Brunswick Ave., Trenton, N. J.
Manufacturers' Fin Coil Co., 2505-7 S. Pulaski Rd., Chicago, Ill.
McCord Radiator & Mfg. Co., 2587 E. Grand Blvd., Detroit, Mich.
McQuay, Inc., 1600 Broadway, N. E., Minneapolis, Minn.
Peerless of America, Inc., 515 W. 35th St., Chicago, Ill.
Refrigeration Appliances, Inc., 917-923 W. Lake St., Chicago, Ill.
Refrigeration Economics Co., Inc., 1232 Second St., N. E., Canton, O.
Rempe Co., 340 N. Sacramento Blvd., Chicago, Ill.
Rome-Turney Radiator Co., Canal St., Rome, N. Y.
Schutte & Koerting Co., 12th & Thompson Sts., Philadelphia, Pa.
Tilco-Fin, Inc., 58 Second Ave., Brooklyn, N. Y.
Vapor Car Heating Co., Inc., 80 E. Jackson St., Chicago, Ill.
Wolverine Tube Co., 1455 Central Ave., Detroit, Mich.

TUBING, FLEXIBLE METAL

(See Hose, Metal)

TUBING, STEEL

Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
Babcock & Wilcox Co., 85 Liberty St., New York, N. Y.
Bethlehem Steel Co., Bethlehem, Pa.
Bundy Tubing Co., 10951 Hern, Detroit, Mich.
Detroit Seamless Steel Tubes Co., c/o Grand River Station, Detroit, Mich.
Columbia Steel Co., United States Steel Corp. Sub., 235 Montgomery St., San Francisco, Cal.
Globe Steel Tubes Co., 3839 W. Burnham St., Milwaukee, Wis.
Jones & Laughlin Steel Corp., Third & Rose St., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., Rm. 1317, St. Louis, Mo.
National Tube Co., United States Steel Corp. Sub., Frick Bldg., Pittsburgh, Pa.
Parker Appliance Co., The, 17325 Euclid Ave., Cleveland, O.
Pittsburgh Steel Co., Grant Bldg., Pittsburgh, Pa.
Republic Steel Corp., Republic Bldg., Cleveland, O.
Ryerson & Son, Inc., Jos. T., 2558 W. 16th St., Chicago, Ill.
South Chester Tube Co., Front & Thurlow Sts., Chester, Pa.
Spang Chalfant, Inc., Div. of National Supply Co., Grant Bldg., Pittsburgh, Pa.
Standard Tube Co., 14600 Woodward Ave., Highland Park, Mich.
Steel and Tubes, Div. of Republic Steel Corp., 224 E. 131st St., Cleveland, O.
Timken Steel & Tube Co., Canton, O.
Wheatland Tube Co., 606-608 Real Estate Trust Bldg., Philadelphia, Pa.
Youngstown Sheet & Tube Co., 602 Stambaugh Bldg., Youngstown, O.

TUBING, WROUGHT IRON

Byers Co., A. M., Clark Bldg., Pittsburgh, Pa.

TURBINES
Mechanical Drive

Allis-Chalmers Mfg. Co., 1126 S. 70th St., Milwaukee, Wis.
Carling Turbine Blower Co., 25 St. John's Rd., Worcester, Mass.
Coppus Engineering Corp., 374 Park Ave., Worcester, Mass.
Dean Hill Pump Co., 23rd & St. Charles Sts., Anderson, Ind.
De Laval Steam Turbine Co., 300 Nottingham Way, Trenton, N. J.
Elliott Co., Jeannette, Pa.
General Electric Co., 1 River Rd., Schenectady, N. Y.
Moore Steam Turbine Corp., Wellsville, N. Y.
Moore Steam Turbine Div., Worthington Pump & Machinery Corp., Harrison, N. J.
Murray Iron Wks. Co., 1106 Washington St., Burlington, Ia.
Sturtevant Co., B. F., Damon St., Hyde Park, Boston, Mass.
Terry Steam Turbine Co., The, P. O. Box 1200, Hartford, Conn.
Westinghouse Electric & Mfg. Co., Philadelphia, Pa.
Wing Mfg. Co., L. J., 158 West 14th St., New York, N. Y.

UNIONS, PIPE
Brass (B), Malleable (M) Steel (S)

Alloy Steel Products Co., 1000 W. Elizabeth Ave., Linden, N. J. (S)
Belknap Mfg. Co., 800 Union Ave., Bridgeport, Conn. (B)
Central Forging Co., Mill St., Catawissa, Pa. (S)
Champion Machine & Forging Co., 3678 E. 78th St., Cleve., O. (S)
Commonwealth Brass Corp., 4208 Davis Lane, Detroit, Mich. (B)
Corley Co., 629 Grove St., Jersey City, N. J. (M)
Crane Co., 836 S. Michigan Ave., Chicago, Ill. (B) (M) (S)
Dart Mfg. Co., E. M., 134 Thurber Ave., Providence, R. I. (M)
Detroit Brass & Malleable Wks., 100 S. Campbell, Detroit, Mich. (M)
Devlin Mfg. Co., Inc., Thos., Burlington, N. J. (B) (M)
Fairbanks Co., 396 Lafayette St., New York, N. Y. (M)
Flagg & Co., Inc., Stanley B., 1421 Chestnut St., Philadelphia, Pa. (B) (M)
General Fittings Co., 123 Georgia Ave., Providence, R. I. (B) (M)
Grabler Mfg. Co., 6565 Broadway, Cleveland, O. (B) (M)
Grinnell Co., Inc., 260 W. Exchange, Providence, R. I. (M)
Hays Mfg. Co., 801 W. 12th St., Erie, Pa. (B)
Henry Valve Co., 1019 N. Spaulding Ave., Chicago, Ill. (S)
Illinois Malleable Iron Co., 1801 Diversey Ave., Chicago, Ill. (M)
Jarecki Mfg. Co., 1345 W. 12th St., Erie, Pa. (B) (M)
Jefferson Union Co., Sales Office, 601 W. 26th St., New York, N. Y.; Factory, Lexington, Mass. (M)
Kennedy Valve Mfg. Co., The, Elmira, N. Y.
King Union Co., Inc., Hillsgrove, R. I. (B)
Lockport Fittings Co., Inc., 71 Gooding St., Lockport, N. Y. (B)
Lunkenheimer Co., Waverly & Beekman Sts., Cincinnati, O. (B)
Malleable Iron Fittings Co., Branford, Conn. (M)
Milwaukee Valve Co., S. Burrell St. and E. Hayes Ave., Milwaukee, Wis. (B)
Mueller Brass Co., Lapeer Ave., Port Huron, Mich. (B)
Ohio Brass Co., N. Main St., Mansfield, O. (Elbows) (B)
Ohio Pattern Wks. & Foundry Co., Eureka Valve Div., 2735 Colerain Ave., Cincinnati, O. (B)
Parker Appliance Co., The, 17325 Euclid Ave., Cleveland, O. (B)
Phoenix Brass Fittings Corp., Colt St. & Chancellor Ave., Irvington, N. J. (B)
Pittsburgh Valve & Fittings Corp., Barberton, O. (B) (M)
Powell Co., Wm., 2525 Spring Grove Ave., Cincinnati, O. (B)
Rhode Island Fittings Co., Jefferson St., Hillsgrove, R. I. (B) (M)
Rockwood Sprinkler Co., 38 Harlow St., Worcester, Mass. (M) (S)
Roessing Mfg. Co., 1616 Noble St., Sharpsburg Sta., Pittsburgh, Pa. (S)
Standard Union Co., 71 Gooding St., Lockport, N. Y. (B) (M)
Star Mfg. Co., Inc., 530 Kinsley Ave., Providence, R. I. (M)
Stockham Pipe Fittings Co., 4100 Tenth Ave., N., Birmingham, Ala. (M)
Streamline Pipe & Fittings Div., Mueller Brass Co., 1925 Lapeer Ave., Port Huron, Mich. (B)
United Superior Union Co., Inc., 29 Ryerson St., Brooklyn, N. Y. (M)
Vogt Machine Co., Henry, 10th & Ormsby Sts., Louisville, Ky. (S)
Walworth Co., 60 E. 42nd St., New York, N. Y. (B) (M) (S)
Ward Foundries, Inc., J. P., Blossburg, Pa. (M)
Watson-Stillman Co., 140 Aldene Rd., Roselle, N. J. (S)
Williams Valve Co., D. T., Spring Grove Ave. & Township St., Cincinnati, O. (B)

UNIT COOLERS
Floor Type (F), Ceiling Type (C)

Acme Industries, Inc., Cor. Mechanic and Ganson Sts., Jackson, Mich. (F) (C)
American Blower Corp., 6000 Russell St., Detroit, Mich. (F) (C)
American Coils, Inc., 25-27 Lexington St., Newark, N. J. (C)
Baker Ice Machine Co., Inc., 1508 Evans St., Omaha, Nebr. (F) (C)
Ballantyne Co., 222 N. 16th St., Omaha, Nebr. (F) (C)
Berns Specialty Co., 1015 Lake St., Chicago, Ill. (C)
Betz Air Conditioning Corp., 1820 Wyandotte St., Kansas City, Mo. (F)

Buffalo Forge Co., 171 Mortimer St., Buffalo, N. Y. (F) (C)
Bush Mfg. Co., 100 Wellington St., Hartford, Conn. (C)
Carbondale Division, Worthington Pump & Machinery Corp., Harrison, N. J. (F) (C)
Carrier Corp., 302 S. Geddes St., Syracuse, N. Y. (F) (C)
Clarage Fan Co., Porter St., Kalamazoo, Mich. (F) (C)
Conditionaire Unit Co., 2821 Montrose Ave., Chicago, Ill. (F) (C)
Coolmaster Corp., 530 S. Dearborn St., Chicago, Ill. (Evaporative cooling principle, no dehumidifying) (F) (C)
Curtis Refrigerating Machine Co., 1950 Kienlen Ave., St. Louis, Mo. (F) (C)
Drayer & Hanson, Inc., 738 E. Pico Blvd., Los Angeles, Cal. (F) (C)
Economy Equipment Co., 223 N. Wolcott Ave., Chicago, Ill. (F)
Fedders Mfg. Co., Inc., 57 Tonawanda St., Buffalo, N. Y. (F) (C)
Frick Co., W. Main St., Waynesboro, Pa. (F)
General Electric Co., Air Conditioning and Commercial Refrigeration Dept., 5 Lawrence St., Bloomfield, N. J. (C)
General Refrigeration Div., Yates-American Machine Co., Beloit, Wis. (F) (C)
Governair Corp., 605 W. Main St., Oklahoma City, Okla.
Hastings Air Conditioning Co., Inc., Box 481, 615 W. South St., Hastings, Neb. (F) (C)
Howe Ice Machine Co., 2825 Montrose Ave., Chicago, Ill. (F) (C)
Ilg Electric Ventilating Co., 2850 N. Crawford Ave., Chicago, Ill. (C)
Industrial Mfg. & Engineering Co., 3825 N. Ravenswood Ave., Chicago, Ill. (F)
Jaden Mfg. Co., Golden Rod Products, Hastings, Nebr.
Johnson Fan & Blower Corp., 1320 W. Lake St., Chicago, Ill. (C)
Kauffman Air Conditioning Corp., 4336 W. Pine Blvd., St. Louis, Mo. (F) (C)
Kennard, Inc., Sam, 3333-35 Market St., St. Louis, Mo. (F)
King Ventilating Co., Box 178, Owatonna, Minn. (C)
Kramer Trenton Co., 626 Brunswick Ave., Trenton, N. J. (F) (C)
Larkin Coils, Inc., 519 Memorial Dr., S. E., Atlanta, Ga. (C)
Marlo Coil Co., 6135 Manchester Ave., St. Louis, Mo. (C)
McCord Radiator & Mfg. Co., 2587 E. Grand Blvd., Detroit, Mich.
McQuay, Inc., 1600 Broadway, N. E., Minneapolis, Minn. (F) (C)
Merchant & Evans Co., 2035 Washington Ave., Philadelphia, Pa. (C)
Modine Mfg. Co., 17th St., Racine, Wis. (C)
Norge Div., Borg-Warner Corp., 670 E. Woodbridge St., Detroit, Mich. (F) (C)
Palmer Mfg. Corp., Phoenix, Ariz. (F) (C)
Peerless of America, Inc., 515 W. 35th St., Chicago, Ill. (F) (C)
Refrigeration Appliances, Inc., 917-923 W. Lake St., Chicago, Ill. (F) (C)
Refrigeration Economics Co., Inc., 1232 Second St., N. E., Canton, O. (F) (C)
Rempe Co., 340 N. Sacramento Blvd., Chicago, Ill. (F) (C)
St. Louis Blow Pipe & Heater Co., 1954 N. 9th St., St. Louis, Mo. (F) (C)
Simmons Co., Gordon H., 926 N. Cass St., Milwaukee, Wis. (C)
Sturtevant Co., B. F., Damon St., Hyde Park, Boston, Mass.
Super Radiator Corp., 320 Plymouth Bldg., Minneapolis, Minn. (C)
Trane Co., The, La Crosse, Wis. (F) (C)
U. S. Air Conditioning Corp., 2101 Kennedy St., N. E., Minneapolis, Minn. (F) (C)
Unit Heater & Cooler Co., 1002-1024 Third St., Wausau, Wis. (C)
Vilter Mfg. Co., 2148 S. First St., Milwaukee, Wis. (F)
Westinghouse Electric & Mfg. Co., Springfield, Mass. (F) (C)
Wing Mfg. Co., L. J., 158 W. 14th St., New York, N. Y. (C)
X L Refrigerating Co., 1834 W. 59th St., Chicago, Ill. (F) (C)
York Ice Machinery Corp., Roosevelt Ave., York, Pa. (F) (C)
Young Radiator Co., 709 S. Marquette St., Racine, Wis., (C)

UNIT HEATERS
Electric

American Instrument Co., Silver Spring, Md.
Autovent Fan & Blower Co., 1811-27 Kostner Ave., Chicago, Ill.
Electric Air Heater Co., Sub. American Foundry Equipment Co., 618 Byrkit St., Mishawaka, Ind.
General Electric Co., 1 River Rd., Schenectady, N. Y.
Hynes Electric Heating Co., 240 Cherry St., Philadelphia, Pa.
Ilg Electric Ventilating Co., 2850 N. Crawford Ave., Chicago, Ill.
Red Spot Electric Co., 4302 S. Tacoma Way, Tacoma, Wash.
Samson-United Corp., 1700 University Ave., Rochester, N. Y.
Steamaire Co., Cincinnati, O.
Trent Co., Harold E., 55th St. & Wyalusing Ave., Phila., Pa.
Vulcan Electric Co., Lynn, Mass.
Warren Electric Appliance Co., Warren Bank & Trust Co. Bldg., Warren, Pa.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
Wiegand Co., Edwin L., 7500 Thomas Blvd., Pittsburgh, Pa.

UNIT HEATERS
Gas-Fired

Automatic Gas Equipment Co., 301 Brushton Ave., Pittsburgh, Pa.
Bryant Heater Co., The, 17825 St. Clair Ave., Cleveland, O.
Buffalo Forge Co., 171 Mortimer St., Buffalo, N. Y.
Campbell Heating Co., E. K., 2445 Charlotte St., Kansas City, Mo.
Carrier Corp., 302 South Geddes St., Syracuse, N. Y.
Continental Stove Corp., Front and Walnut Sts., Ironton, O.
Dowagiac Steel Furnace Co., Beeson St., Dowagiac, Mich.
Dravo Corp., Dravo Bldg., Pittsburgh, Pa.
General Gas Light Co., 212 N. Park, Kalamazoo, Mich.
Heating Equipment Co., 1123 Harrison Ave., San Francisco, Calif.
McCann Furnace Co., 5005 Euclid Ave., Cleveland, O.
McCord Radiator & Mfg. Co., 2587 E. Grand Blvd., Detroit, Mich.
Mueller Furnace Co., L. J., 2005 W. Oklahoma Ave., Milwaukee, Wis.
Pacific Gas Radiator Co., Roseberry and Walter Sts., Huntington Park, Cal.
Palmer Mfg. Corp., Phoenix, Ariz.
Reznor Mfg. Co., Mercer, Pa.
Ross Engineering Corp., J. O., 350 Madison Ave., New York, N. Y.
Schoedinger, F. O., 322-358 Mt. Vernon Ave., Columbus, O.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.
Trane Co., The, La Crosse, Wis.
Utility Fan Corp., 2528 Santa Fe Ave., Los Angeles, Cal.

UNIT HEATERS
Steam and Hot Water

Airtherm Mfg. Co., 700 S. Spring Ave., St. Louis, Mo.
American Blower Corp., 6000 Russell St., Detroit, Mich.
Autovent Fan & Blower Co., 1811-27 N. Kostner Ave., Chicago, Ill.
Bayley Blower Co., 1817 S. 66th St., Milwaukee, Wis.
Beacon-Morris Corp., 702 Beacon St., Boston, Mass.

Instantaneous! *Direct-reading!*

ALNOR VELOMETER

THE ALL-PURPOSE AIR VELOCITY METER

Indispensable to engineers and technicians is this practical, all-purpose Alnor Velometer — responsive — accurate — ruggedly designed. As a portable instrument, it provides the means for easily and speedily measuring air velocities in all types of grilles, ducts, ceiling outlets, etc. A number of jets provide full versatility—total pressure, static pressure, larger duct, suction and many other readings. This instrument is advantageously used in ordinarily inaccessible locations. Fully described in completely illustrated bulletin. Write for your copy today.

ITL *Don't Guess Know!*

Illinois Testing Laboratories Inc.

143 WEST HUBBARD STREET, CHICAGO, ILL.

Manufacturers of Electric Thermometers and Pyrometers

Berns Specialty Co., 1015 Lake St., Chicago, Ill.
Bishop & Babcock Mfg. Co., 4901 Hamilton Ave., Cleveland, O.
Blower Application Co., 918 N. Fourth St., Milwaukee, Wis.
Bros Boiler & Mfg. Co., Wm., Nicollet Island, Minneapolis, Minn.
Buffalo Forge Co., 171 Mortimer St., Buffalo, N. Y.
Burnham Boiler Corp., Main St., Irvington, N. Y.
Campbell Heating Co., E. K., 2445 Charlotte St., Kansas City, Mo.
Carrier Corp., 302 S. Geddes St., Syracuse, N. Y.
Clarage Fan Co., Porter St., Kalamazoo, Mich.
Crane Co, 836 S. Michigan Ave., Chicago, Ill.
Drayer & Hanson, Inc., 738 E. Pico Blvd., Los Angeles, Cal.
Dunham Co., C. A., 450 E. Ohio St., Chicago, Ill.
Economy Electric Mfg. Co., 4606 W. 21st Pl., Chicago, Ill.
Electrovent Fan & Mfg. Co., 812 W. Lake St., Chicago, Ill.
Fedders Mfg. Co., Inc., 57 Tonawanda St., Buffalo, N. Y.
Grinnell Co., Inc., 260 W. Exchange, Providence, R. I.
Hartzell Propeller Fan Co., P. O. Box 909, Roosevelt Ave., Piqua, O.
Hastings Air Conditioning Co., Inc., Box 481, 615 W. South St., Hastings, Neb.
Ilg Electric Ventilating Co., 2850 N. Crawford Ave., Chicago, Ill.
Industrial Mfg. & Engrg. Co., 3845 N. Ravenswood Ave., Chicago, Ill.
Jaden Mfg. Co., F., Golden Rod Products, Hastings, Neb.
Johnson Fan & Blower Corp., 1320 W. Lake St., Chicago, Ill.
King Ventilating Co., Box 178, Owatonna, Minn.
Kisco Boiler & Engineering Co., 3732 Chouteau Ave., St. Louis, Mo.
Kramer Trenton Co., 626 Brunswick Ave., Trenton, N. J.
Lohman, Inc., Wm. J., 62 Ninth Ave., New York, N. Y.
McCord Radiator & Mfg. Co., 2587 E. Grand Blvd., Detroit, Mich.
McQuay, Inc., 1600 Broadway, N. E., Minneapolis, Minn.
Modine Mfg. Co., 17th St., Racine, Wis.
Murray Iron Wks. Co., 1106 Washington St., Burlington, Ia.
Murray Mfg. Co., D. J., Wausau, Wis.
National Radiator Co., 221 Central Ave., Johnstown, Pa.
Nelson Corporation, The, Herman, Moline, Ill.
Nesbitt, Inc., John J., & Buckeye Blower Co., State Rd. & Rhawn St., Philadelphia, Pa.
New York Blower Co., 3155 Shields Ave., Chicago, Ill.
Niagara Blower Co., 6 E. 45th St., New York, N. Y.
Perfex Corp. (Unit Heater Div.), 500 W. Oklahoma Ave., Milwaukee, Wis.
Refrigeration Economics Co., Inc., 1232 Second St., N. E., Canton, O.
Richmond Engineering Co., Inc., 7th & Hospital Sts., Richmond, Va.
Rome-Turney Radiator Co., Canal St., Rome, N. Y.
St. Louis Blow Pipe & Heater Co., 1954 N. 9th St., St. Louis, Mo.
Steamaire Co., Cincinnati, O.
Sturtevant Co., B. F., Damon St., Hyde Park, Boston, Mass.
Super Radiator Corp., 320 Plymouth Bldg., Minneapolis, Minn.
Trane Co., The, La Crosse, Wis.
U. S. Air Conditioning Corp., 2101 Kennedy St., N. E., Minneapolis, Minn.
Unit Heater & Cooler Co., 1002-1024 Third St., Wausau, Wis.
Webster & Co., Warren, 17th & Federal Sts., Camden, N. J.
Western Blower Co., 1800 Airport Way, Seattle, Wash.
Wing Mfg. Co., L. J., 158 West 14th St., New York, N. Y.
Young Radiator Co., 709 S. Marquette St., Racine, Wis.

UNIT VENTILATORS

Johnson Fan & Blower Corp., 1320 W. Lake St., Chicago, Ill.
Nelson Corporation, The, Herman, Moline, Ill.
Nesbitt, Inc., John J., & Buckeye Blower Co., State Rd. & Rhawn St., Philadelphia, Pa.
New York Blower Co., 3155 Shields Ave., Chicago, Ill.
Peerless Unit Ventilation Co., Inc., 810 Union Ave., Bridgeport, Conn.
Sturtevant Co., B. F., Damon St., Hyde Park, Boston, Mass.
Trane Co., The, La Crosse, Wis.
Young Radiator Co., 709 S. Marquette St., Racine, Wis.

VACUUM GAGES

(See Gages, Vacuum)

VACUUM PUMPS

(See Pumps, Vacuum Heating)

VACUUM RECORDERS

(See Recorders, Vacuum and Pressure)

VACUUM SYSTEMS

(See Heating Systems, Vacuum)

VALVE MOTORS

(See Motors, Valve-Operating)

VALVES, RADIATOR
Automatic Temp. Control

Electric (E). Pneumatic (P). Self-actuated (C)

American District Steam Co., Bryant St., North, Tonawanda, N. Y.
Au-Temp-Co Corp., 1 Park Ave., New York, N. Y. (C) (E)
Barber-Colman Co., 225 Loomis St., Rockford, Ill. (E)
Clees Valve & Engineering Co., 90 West St., New York, N. Y. (C)
Edison, Inc., Thos. A., Edison Electrical Controls Div., Lakeside Ave., West Orange, N. J. (C)
Electric Valve Mfg. Co., Inc., 68 Murray St., New York, N. Y. (E)
Electrimatic Corp., 2100 Indiana Ave., Chicago, Ill. (C)
Fulton-Sylphon Co., Knoxville, Tenn. (C) (E)
General Controls Co., 700 W. Ivy St., Glendale, Cal. (E)
Herske & Timmis, Inc., 33 W. 60th St., New York, N. Y. (C)
Johnson Service Co., 507 E. Michigan St., Milwaukee, Wis. (P)
Lawler Automatic Controls, Inc., 453 N. MacQuesten Pkwy., Mount Vernon, N. Y. (C)
Leslie Co., Valley Brook & Grant Aves., Lyndhurst, N. J. (C)
Manning, Maxwell & Moore, Inc., American Schaeffer & Budenberg Instrument Div., 11 Elias St., Bridgeport, Conn. (C) (P)
Minneapolis-Honeywell Regulator Co., 2701 Fourth Ave., South, Minneapolis, Minn. (C) (P)
Powers Regulator Co., 2720 Greenview Ave., Chicago, Ill. (C) (P)
Sarco Co., Inc., 183 Madison Ave., New York, N. Y. (E)
Sterling, Inc., 3738 N. Holton St., Milwaukee, Wis. (C)
Sullivan Valve & Engineering Co., 910 S. Arizona St., Butte, Mont. (C)
Tallmadge & Co., Webster, 255 N. 18th St., East Orange, N. J. (E)
Trane Co., The, La Crosse, Wis. (C)
Vapor Car Heating Co., Inc., 80 E. Jackson Blvd., Chicago, Ill. (E)

VALVES, RADIATOR
Hand Operated

On-and-off (S). Modulating (M). Orifice (O)

American District Steam Co., Bryant St., North Tonawanda, N. Y. (M) (O)
Barnes & Jones, Inc., 128 Brookside Ave., Jamaica Plain, Boston, Mass. (M) (O)
Belfield Co., H., 435 N. Broad St., Philadelphia, Pa. (S)
Belknap Mfg. Co., 800 Union Ave., Bridgeport, Conn. (S) (M)
Bell & Gossett Co., 3000 Wallace St., Chicago, Ill. (O)
Bishop & Babcock Mfg. Co., 4901 Hamilton Ave., Cleveland, O. (S) (M)
Burnham Boiler Corp., Main St., Irvington, N. Y. (S)
Capitol Brass Div., Bohn Aluminum & Brass Corp., 2306 Franklin St., Detroit, Mich. (S) (M)
Cashin Co., W. D., 69 A St., Boston, Mass. (M)
Commonwealth Brass Corp., 5781-5835 Commonwealth Ave., Detroit, Mich. (S) (M)
Crane Co., 836 S. Michigan Ave., Chicago, Ill. (S) (M)
Cryer Trap & Valve Co., Inc., 366 Madison Ave., New York, N. Y. (S)
Detroit Brass & Malleable Wks., 100 S. Campbell, Detroit, Mich. (S)
Detroit Lubricator Co., 5900 Trumbull Ave., Detroit, Mich. (S) (M) (O)
Dunham Co., C. A., 450 E. Ohio St., Chicago, Ill. (M) (O)
Fairbanks Co., 396 Lafayette St., New York, N. Y. (S)
Fulton Sylphon Co., Knoxville, Tenn. (M)
Gorton Heating Corp., Cranford, N. J. (S) (M)
Grinnell Co., Inc., 260 W. Exchange, Providence, R. I. (S) (O)
Haines & Co., William S., 12th & Buttonwood Sts., Philadelphia, Pa. (S) (M) (O)
Hammond Brass Wks., Summer Blvd., Hammond, Ind. (S)
Hoffman Specialty Co., Inc., Waterbury Natl. Bank Bldg., Waterbury, Conn. (S) (M) (O)
Illinois Engineering Co., 2035 S. Racine Ave., Chicago, Ill. (S) (M) (O)
Jarecki Mfg. Co., 1345 W. 12th St., Erie, Pa. (S)
Jenkins Bros., 80 White St., New York, N. Y. (S)
Kennedy Valve Mfg. Co., Elmira, N. Y. (S)
Lunkenheimer Co., Waverly & Beekman Sts., Cincinnati, O. (S)
Marsh Corp., Jas. P., 2073 Southport Ave., Chicago, Ill. (S) (M)
Marsh Valve Co., 4th St. & Brigham Rd., Dunkirk, N. Y. (M)
McAlear Mfg. Co., 1901-1909 S. Western Ave., Chicago, Ill. (S) (M)
Milwaukee Valve Co., S. Burrell St. at E. Hayes Ave., Milwaukee, Wis. (S) (M) (O)
Monash-Younker Co., 1315 W. Congress St., Chicago, Ill. (S) (M)
Mouat Vapor Heating Co., The, 1246-1254 W. 4th St., Cleveland, O. (M)
New York Air Valve Corp., 611-621 Broadway, New York, N. Y. (O)
Ohio Brass Co., N. Main St., Mansfield, O. (S) (M)
Ohio Pattern Wks. & Fdry. Co., Eureka Valve Div., 2735 Colerain Ave., Cincinnati, O. (S) (M)
Pierce, Butler Radiator Corp., 701 Nichols Ave., Syracuse, N. Y. (S) (M)
Powell Co., Wm., 2525 Spring Grove Ave., Cincinnati, O. (S)
Rockford Brass Works, 700 S. Main St., Rockford, Ill. (S)
Sarco Co., Inc., 183 Madison Ave., New York, N. Y. (S) (M) (O)
Simplex Heating Specialty Co., Inc., Pettyjohn Bldg., Lynchburg, Va. (M)
Sterling, Inc., 3738 N. Holton St., Milwaukee, Wis., (S) (M) (O)
Stickle Steam Specialties Co., 2215 Valley Ave., Indianapolis, Ind.
Tallmadge & Co., Webster, 255 N. 18th St., East Orange, N. J. (S) (M) (O)
Trane Co., The, La Crosse, Wis. (S) (M) (O)
Vapor Specialty Co., 101 W. 42nd St., New York, N. Y. (M)
Walker & Eder, 37 W. 39th St., New York, N. Y. (O)
Walworth Co., 60 E. 42nd St., New York, N. Y. (S)
Webster & Co., Warren, 17th & Federal Sts., Camden, N. J. (S) (M) (O)
Williams Valve Co., D. T., Spring Grove Ave., & Township St., Cincinnati, O. (S)

VALVES, REFRIGERATION
Check, Angle, Needle, Relief, Gate, Globe

Ashton Valve Co., 161—1st St., Cambridge, Mass.
Baker Ice Machine Co., Inc., 1508 Evans St., Omaha, Neb.
Belknap Mfg. Co., 800 Union Ave., Bridgeport, Conn.
Carbondale Div., Worthington Pump & Machinery Corp., Harrison, N. J.
Conditionaire Unit Co., 2821 Montrose Ave., Chicago, Ill.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Frick Co., Waynesboro, Pa.
Henry Valve Co., 1019 N. Spaulding Ave., Chicago, Ill.
Imperial Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.
Kennedy Valve Mfg. Co., The, Elmira, N. Y.
Kerotest Mfg. Co., 2525 Liberty Ave., Pittsburgh, Pa.
Klingret, Inc., 16-22 Hudson St., New York, N. Y.
Lunkenheimer Co., Waverly & Beekman Sts., Cincinnati, O.
Mueller Brass Co., Lapeer Ave., Port Huron, Mich.
Parker Appliance Co., The, 17325 Euclid Ave., Cleveland, O.
Peerless of America, Inc., 515 W. 35th St., Chicago, Ill.
Pierce, Butler Radiator Corp., 701 Nichols Ave., Syracuse, N. Y.
Scott Valve Mfg. Co., 3963 McKinley Ave., Detroit, Mich.
Shank Co., Cyrus, 625 W. Jackson Blvd., Chicago, Ill.
Superior Valve & Fittings Co., 1509 W. Liberty Ave., Pittsburgh, Pa.
Triumph Ice Machine Co., 107-109 E. Front St., Cincinnati, O.
Vilter Mfg. Co., 2148 S. First St., Milwaukee, Wis.
Vogt Machine Co., Henry, 10th & Ormsby Sts., Louisville, Ky.
Walworth Co., 60 E. 42nd St., New York, N. Y.
X L Refrigerating Co., 1834 W. 59th St., Chicago, Ill.
York Ice Machinery Corp., Roosevelt Ave., York, Pa.

VALVES, REFRIGERATION
Back Pressure

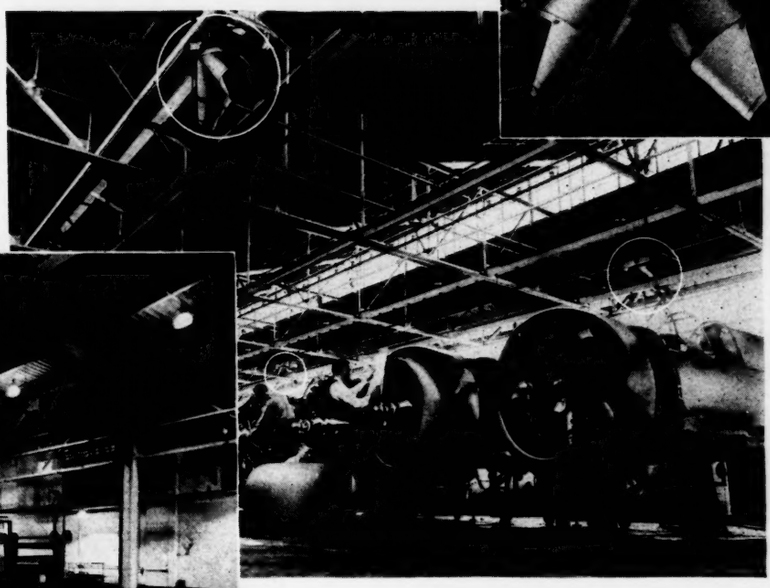
Alco Valve Co., 2628 Big Bend Blvd., St. Louis, Mo.
Baker Ice Machine Co., Inc., 1508 Evans St., Omaha, Neb.
Burrows Mfg. Co., F. A., 1638 E. Market St., York, Pa.
Cash Co., A. W., P. O. Box 135, Decatur, Ill.
Cash Universal Regulator Co., Marshalltown, Ia.
Electrimatic Corp., 2100 Indiana Ave., Chicago, Ill.
Fedders Mfg. Co., Inc., 57 Tonawanda St., Buffao, N. Y.
Frick Co., Waynesboro, Pa.
Foster Engineering Co., 109 Monroe St., Newark, N. J.
Hubbel Corp., 1315 W. Carroll Ave., Chicago, Ill.
Imperial Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.
Mason-Neilan Regulator Co., 1190 Adams St., Boston, Mass.
Mueller Brass Co., Lapeer Ave., Port Huron, Mich.
Natural Gas Equipment Incorporated, 539 Petroleum Bldg., Los Angeles, Cal.
X L Refrigerating Co., 1834 W. 59th St., Chicago, Ill.
York Ice Machinery Corp., Roosevelt Ave., York, Pa.

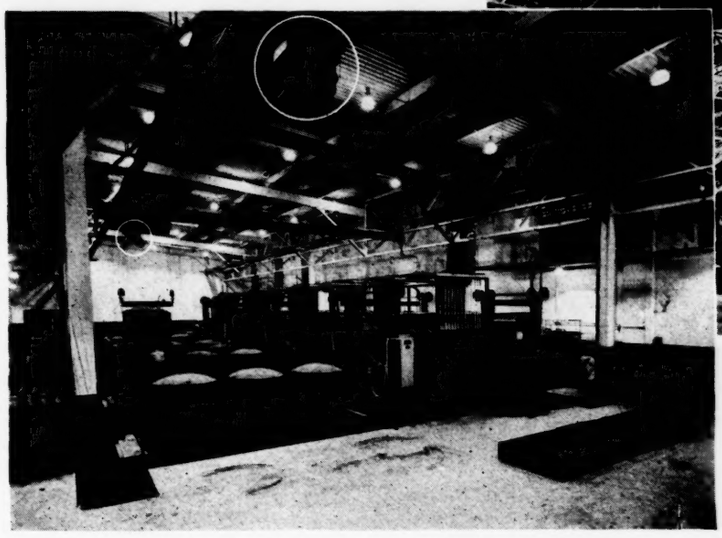
When Uncle Sam "Turns on the Heat"

Thousands of American factory workers, under pressure to speed up National Defense production this Fall and Winter, will be more contented and efficient in their work because they will be comfortably warmed by

WING

REVOLVING DISCHARGE UNIT HEATERS





Above: Wing Revolving Discharge Heater - - some of the 43 Wing Unit Heaters installed in the Curtiss-Wright plant at Buffalo, N. Y.

Left: Some of the 116 WING Heaters installed in the Wright Aeronautical plant at Paterson, N. J. These are in the Nitriding Department.

THE installations of Wing "Featherweight", Ceiling-Suspended Unit Heaters by the Wright Aeronautical Corporation and the Curtiss-Wright Corporation are representative of the recognition accorded the "Floodlight System" of industrial plant heating originated by WING in 1921. Leading manufacturers in every type of industry have installed WING Heaters, acknowledging this system as the best method for securing proper distribution of heat in their plants.

There are 116 WING Heaters in the Wright Aeronautical plant at Paterson, N. J., including those in their recent addition, plant No. 2. The Curtiss-Wright Corporation has installed 43 WING Unit Heaters in their Buffalo plant. Other prominent installations range from 50 to over 100 WING Heaters.

Many of these recent WING installations include the Revolving Discharge Heater—a refinement in the *efficiency of heat distribution* which is as great a contribution by WING to the progress of industrial plant heating as was the original WING system of projecting heat downward by means of lightweight, ceiling-suspended heaters.

Would you like full details on how WING Revolving Discharge Heaters effect unprecedented efficiency in heat distribution? Then send for a copy of BULLETIN H-8.

By "revolving the outlets" WING has brought a new sensation of heating comfort to factory workers . . . a sensation of air that is fresh, alive and invigorating.

THE AIR AT CEILING IS DRAWN THROUGH HEATING ELEMENT AND PROJECTED THROUGH REVOLVING DISCHARGE OUTLETS TO WORKING LEVEL
WING
DISCHARGE-OUTLETS-REVOLVE-SLOWLY

L. J. WING MFG. CO., 158 W. 14th ST., NEW YORK CITY

WING REVOLVING DISCHARGE UNIT HEATERS

VALVES, REFRIGERATION Expansion

Constant Pressure (CP) and Thermostatic (T)

Alco Valve Co., 2628 Big Bend Blvd., St. Louis, Mo. (CP) (T)
American Injector Co., 1481—14th St., Detroit, Mich. (CP) (T)
Automatic Products Co., 2450 N. 32nd St., Milwaukee, Wis. (CP) (T)
Baker Ice Machine Co., Inc., 1508 Evans St., Omaha, Neb. (CP)
Cash Co., A. W., P. O. Box 135, Decatur, Ill. (CP)
Cash Universal Regulator Co., Marshalltown, Ia. (CP)
Cooper Co., Clark, 159 Jefferson St., Philadelphia, Pa.
Detroit Lubricator Co., 5900 Trumbull Ave., Detroit, Mich. (CP) (T)
Fedders Mfg. Co., Inc., 57 Tonawanda St., Buffalo, N. Y. (CP) (T)
Frick Co., Waynesboro, Pa.
Foster Engineering Co., 109 Monroe St., Newark, N. J. (CP)
Fulton Sylphon Co., Knoxville, Tenn. (CP)
Manning, Maxwell & Moore Inc., Consolidated Safety Valve Div., 11 Elias St., Bridgeport, Conn. (CP)
Mayson Mfg. Co., Inc., 4332 Horatio St., Detroit, Mich. (T)
Mueller Brass Co., Lapeer Ave., Port Huron, Mich. (CP) (T)
Peerless of America, Inc., 515 W. 35th St., Chicago, Ill. (CP) (T)
Spoehrer-Lange Company, 3723 Commonwealth Ave., St. Louis, Mo. (T)
Sterling, Inc., 3738 N. Holton St., Milwaukee, Wis. (T)
Stewart Ice Machine Co., 1046 E. 22nd St., Los Angeles, Cal.
Torrey Refrigeration Products, 1000 N. Orange Dr., Los Angeles, Cal. (T)
Triumph Ice Machine Co., 107-109 E. Front St., Cincinnati, O. (CP)
X L Refrigerating Co., 1834 W. 59th St., Chicago, Ill. (CP) (T)

VALVES, REFRIGERATION Float, High Pressure

Alco Valve Co., 2628 Big Bend Blvd., St. Louis, Mo.
American Injector Co., 1481—14th St., Detroit, Mich.
Baker Ice Machine Co., Inc., 1508 Evans St., Omaha, Neb.
Carbondale Div., Worthington Pump & Machinery Corp., Harrison, N. J.
Cooper Co., Clark, 159 Jefferson St., Philadelphia, Pa.
Defender Automatic Regulator Co., 308 S. 8th St., St. Louis, Mo.
Foster Engineering Co., 109 Monroe St., Newark, N. J.
Frick Co., Waynesboro, Pa.
Hubbell Corp., 1315 W. Carroll Ave., Chicago, Ill.
Imperial Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.
McDonnell & Miller, 400 N. Michigan Ave., Chicago, Ill.
Mercoid Corp., The, 4201 Belmont Ave., Chicago, Ill.
Mueller Brass Co., Lapeer Ave., Port Huron, Mich.
Strong, Carlisle & Hammond Co., The, 1392 W. Third St., Cleveland, O.
Vilter Mfg. Co., 2148 S. First St., Milwaukee, Wis.
Voss Co., J. H. H., 408 Concord Ave., New York, N. Y.
X L Refrigerating Co., 1834 W. 59th St., Chicago, Ill.
York Ice Machinery Corp., Roosevelt Ave., York, Pa.

VALVES, REFRIGERATION Magnetic Stop

Alco Valve Co., 2628 Big Bend Blvd., St. Louis, Mo.
Automatic Products Co., 2450 N. 32nd St., Milwaukee, Wis.
Automatic Switch Co., 41 E. 11th St., New York, N. Y.
Baker Ice Machine Co. Inc., 1508 Evans St., Omaha, Neb.
Cooper Co., Clark, 159 Jefferson St., Philadelphia, Pa.
Detroit Lubricator Co., 5900 Trumbull Ave., Detroit, Mich.
Electric Valve Mfg. Co., Inc., 68 Murray St., New York, N. Y.
Electrimatic Corp., 2100 Indiana Ave., Chicago, Ill.
Frick Co., Waynesboro, Pa.
General Controls Co., 700 W. Ivy St., Glendale, Cal.
Hubbell Corp., 1315 W. Carroll Ave., Chicago, Ill.
Mercoid Corp., The, 4201 Belmont Ave., Chicago, Ill.
Penn Electric Switch Co., Box 556, Goshen, Ind.
Spoehrer-Lange Company, 3723 Commonwealth Ave., St. Louis, Mo.
X L Refrigerating Co., 1834 W. 59th St., Chicago, Ill.

VALVES, REFRIGERATION Water Regulating (Pressure or Temperature Actuated)

Automatic Products Co., 2450 N. 32nd St., Milwaukee, Wis.
Baker Ice Machine Co. Inc., 1508 Evans St., Omaha, Neb.
Cash Co., A. W., P. O. Box 135, Decatur, Ill.
Cooper Co., Clark, 159 Jefferson St., Philadelphia, Pa.
Diamond Castings Co., Terra Cotta Rd., Johnsonburg, Pa.
Electrimatic Corp., 2100 Indiana Ave., Chicago, Ill.
Foster Engineering Co., 109 Monroe St., Newark, N. J.
General Controls Co., 700 W. Ivy St., Glendale, Cal.
General Fittings Co., 123 Georgia Ave., Providence, R. I.
Kieley & Mueller, Inc., 40 W. 13th St., New York, N. Y.
Leslie Co., Valley Brook & Grant Aves., Lyndhurst, N. J.
Mason-Neilan Regulator Co., 1190 Adams St., Boston, Mass.
Mercoid Corp., The, 4201 Belmont Ave., Chicago, Ill.
Mueller Co., Decatur, Ill.
Mueller Brass Co., Lapeer Ave., Port Huron, Mich.
Penn Electric Switch Co., Box 556, Goshen, Ind.
Perfection Refrigeration Parts Co., Harvey, Ill.
Reading-Pratt & Cady Div., American Chain & Cable Co., Inc., Reading, Pa.
Sarco Co., Inc., 183 Madison Ave., New York, N. Y.
Shank Co., Cyrus, 625 W. Jackson Blvd., Chicago, Ill.
Spence Engineering Co., Inc., 28 Grant St., Walden, N. Y.
Tagliabue Mfg. Co., C. J., 540 Park Ave., Brooklyn, N. Y.
Wheelco Instruments Co., 1933 S. Halsted St., Chicago, Ill.

VALVES, SOLDER JOINT

American Brass Co., 414 Meadow St., Waterbury, Conn.
American Radiator & Standard Sanitary Corp., Bessemer Bldg., Pittsburgh, Pa.
Chase Brass & Copper Co., 236 Grand St., Waterbury, Conn.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Darling Valve & Mfg. Co., 701 First St., Williamsport, Pa.
Hammond Brass Wks., Summer Blvd., Hammond, Ind.
Henry Valve Co., 1019 N. Spaulding Ave., Chicago, Ill.
Imperial Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.
Jenkins Bros., 80 White St., New York, N. Y.
Mueller Brass Co., Lapeer Ave., Port Huron, Mich.
Northern Indiana Brass Co., 935 Plum St., Elkhart, Ind.
Pittsburgh Valve & Fittings Corp., Barberton, O.
Powell Co., Wm., 2525 Spring Grove Ave., Cincinnati, O.
Scott Valve Mfg. Co., 3963 McKinley Ave., Detroit, Mich.
Streamline Pipe & Fittings Div., Mueller Brass Co., 1925 Lapeer Ave., Port Huron, Mich.
Walworth Co., 60 E. 42nd St., New York, N. Y. (Brazed)
Williams Valve Co., D. T., Spring Grove Ave. & Township St., Cincinnati, O.

VALVES, SOLENOID

Alco Valve Co., 2628 Big Bend Blvd., St. Louis, Mo.
Anderson Products, Inc., 17 Tudor St., Cambridge, Mass.
Atkins & Son, E. C., 402 S. Illinois St., Indianapolis, Ind.
Au-Temp-Co Corp., 1 Park Ave., New York, N. Y.
Automatic Products Co., 2450 N. 32nd St., Milwaukee, Wis.
Automatic Switch Co., 41 E. 11th St., New York, N. Y.
Baker Ice Machine Co. Inc., 1508 Evans St., Omaha, Neb.
Barber-Colman Co., 225 Loomis St., Rockford, Ill.
Belfield Co., H., 435 N. Broad St., Philadelphia, Pa.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., 4534 Wayne Ave., Philadelphia, Pa.
Cooper Co., Clark, 159 Jefferson St., Philadelphia, Pa.
Cutler-Hammer, Inc., N. 12th St. and W. St. Paul Ave., Milwaukee, Wis.
Davis Regulator Co., 2546 S. Washtenaw Ave., Chicago, Ill.
Detroit Lubricator Co., 5900 Trumbull Ave., Detroit, Mich.
Electric Valve Mfg. Co., Inc., 68 Murray St., New York, N. Y.
Electrimatic Corp., 2100 Indiana Ave., Chicago, Ill.
Frick Co., Waynesboro, Pa.
Friez & Sons, Julien P., 4 N. Central Ave., Baltimore, Md.
General Controls Co., 700 W. Ivy St., Glendale, Cal.
General Electric Co., 1 River Rd., Schenectady, N. Y.
General Sales & Products Corp., 75 Mohawk, Cohoes, N. Y.
Golden-Anderson Valve Specialty Co., Fulton Bldg., Pittsburgh, Pa.
Grayson Heat Control, Ltd., 3000 E. Imperial Hwy., Lynwood, Cal.
Guardian Electric Mfg. Co., 1621 W. Walnut St., Chicago, Ill.
Hammett Mfg. Co., 209 W. 19th Ter., Kansas City, Mo.
Hubbell Corp., 1315 W. Carroll Ave., Chicago, Ill.
Hunt & Son, C. B., Box 300, Salem, O.
McDonnell & Miller, 400 N. Michigan Ave., Chicago, Ill.
Mercoid Corp., The, 4201 Belmont Ave., Chicago, Ill.
Minneapolis-Honeywell Regulator Co., 2701 Fourth Ave., South, Minneapolis, Minn.
Nicholson & Co., W. H., 12 Oregon St., Wilkes-Barre, Pa.
Parker Appliance Co., The, 17325 Euclid Ave., Cleveland, O.
Penn Electric Switch Co., Box 556, Goshen, Ind.
Pfening Co., Fred D., The, 1075 W. 5th Ave., Columbus, O.
R-S Products Corp., Germantown Ave., at Wayne Junction, Philadelphia, Pa.
Rega Mfg. Co., 79 Mt. Hope Ave., Rochester, N. Y.
Ruggles-Klingemann Mfg. Co., 4 Foster Ct., Salem, Mass.
Spoehrer-Lange Company, 3723 Commonwealth Ave., St. Louis, Mo.
Supreme Electric Products Corp., 99 Mt. Hope Ave., Rochester, N. Y.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
Wheelco Instruments Co., 1933 S. Halsted St., Chicago, Ill.
White-Rodgers Electric Co., 1289 Cass Ave., St. Louis, Mo.

VALVES, STEAM & WATER Check, Angle, Gate, Globe, Needle, Relief

Alloy Steel Products Co., 1000 W. Elizabeth Ave., Linden, N. J.
American Brass Co., 414 Meadow St., Waterbury, Conn.
American Hard Rubber Co., 11 Mercer St., New York, N. Y.
American Injector Co., 1481—14th St., Detroit, Mich.
Ashton Valve Co., 161—1st St., Cambridge, Mass.
Barrett, Haentjens & Co., Hazelton, Pa.
Beaton & Cadwell Mfg. Co., 185 Main St., New Britain, Conn.
Belfield Co., H., 435 N. Broad St., Philadelphia, Pa.
Belknap Mfg. Co., 800 Union Ave., Bridgeport, Conn.
Bell & Gossett Co., 3000 Wallace St., Chicago, Ill.
Berger Bros. Co., 229-237 Arch St., Philadelphia, Pa.
Bordo Co., Inc., L. J., 115 New St., Glenside, Pa.
Boylston Steam Specialty Co., 116-122 W. Illinois St., Chicago, Ill.
Capitol Brass Works, Div. Bohn Aluminum & Brass Corp., 2306 Franklin St., Detroit, Mich.
Cash Co., A. W., P. O. Box 135, Decatur, Ill.
Cash Universal Regulator Co., Marshalltown, Ia.
Central Brass Mfg. Co., 2950 E. 55th St., Cleveland, O.
Central Forging Co., Catawissa, Pa.
Central Valve Mfg. Co., 255 E. 95th St., Chicago, Ill.
Chaplin-Fulton Mfg. Co., 28-40 Penn Ave., Pittsburgh, Pa.
Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
Chase Brass & Copper Co., 236 Grand St., Waterbury, Conn.
Cleas Valve & Engineering Co., 90 West St., New York, N. Y.
Cooper Co., Clark, 159 Jefferson St., Philadelphia, Pa.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Darling Valve & Mfg. Co., 701 First St., Williamsport, Pa.
Davis Regulator Co., 2546 S. Washtenaw Ave., Chicago, Ill.
Detroit Brass & Malleable Wks., 100 S. Campbell, Detroit, Mich.
Detroit Lubricator Co., 5900 Trumbull Ave., Detroit, Mich.
Eclipse Fuel Engineering Co., 707 S. Main St., Rockford, Ill.
Edward Valve & Mfg. Co., Inc., 1200 W. 145th St., East Chicago, Ind.
Everlasting Valve Co., 49 Fisk St., Jersey City, N. J.
Fairbanks Co., 396 Lafayette St., New York, N. Y.
Fisher Governor Co., 201 S. First Ave., Marshalltown, Ia.
Foster Engineering Co., 109 Monroe St., Newark, N. J.
Fulflo Specialties Co., Inc., The, Fulflo Bldg., Blanchester, O. (Oil)
Golden-Anderson Valve Specialty Co., Fulton Bldg., Pittsburgh, Pa.
Gorton Heating Corp., Cranford, N. J.
Grinnell Co., Inc., 260 W. Exchange, Providence, R. I.
Hammond Brass Wks., Summer Blvd., Hammond, Ind.
Hasco Valve & Machine Co., 1819 W. St. Paul Ave., Milwaukee, Wis.
Hoffman Specialty Co., Inc., Waterbury Nat'l. Bank Bldg., Waterbury, Conn.
Homestead Valve Mfg. Co., P. O. Box 348, Coraopolis, Pa.
Illinois Engineering Co., 2035 S. Racine Ave., Chicago, Ill.
Imperial Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.
Jarecki Mfg. Co., 1345 W. 12th St., Erie, Pa.
Jenkins Bros., 80 White St., New York, N. Y.
Kainer & Co., 761 W. Lexington, Chicago, Ill.
Kennedy Valve Mfg. Co., The, Elmira, N. Y.
Kieley & Mueller Co., Inc., 40 W. 13th St., New York, N. Y.
Klingerit, Inc., 16-22 Hudson St., New York, N. Y.
Klipfel Mfg. Co., 2651 W. Harrison St., Chicago, Ill.
Locke Regulator Co., 76 North St., Salem, Mass.
Lonergan Co., J. E., 211 Race St., Philadelphia, Pa.

Ludlow Valve Mfg. Co., Foot of Adams St., Troy, N. Y.
Lunkenheimer Co., Waverly & Beekman Sts., Cincinnati, O.
Luzerne Rubber Co., Muirhead Ave., Trenton, N. J.
Maid-O'-Mist, Inc., 215 N. Aberdeen St., Chicago, Ill.
Manning, Maxwell & Moore, Inc., Hancock Valve Div., 11 Elias St., Bridgeport, Conn.
Marsh, Corp., Jas. P., 2089 Southport Ave., Chicago, Ill.
Mason-Neilan Regulator Co., 1190 Adams St., Boston, Mass.
McAlear Mfg. Co., 1901-1909 S. Western Ave., Chicago, Ill.
McDonnell & Miller, 400 N. Michigan Ave., Chicago, Ill.
Milwaukee Valve Co., S. Burrell St. at E. Hayes Ave., Milwaukee, Wis.
Monarch Mfg. Wks., Inc., Salmon & Westmoreland St., Philadelphia, Pa.
Mueller Co., Decatur, Ill.
Mueller Brass Co., Lapeer Ave., Port Huron, Mich.
Mueller Steam Specialty Co., Inc., 40-20 22nd St., Long Island City, N. Y.
Norgren Co., Inc., C. A., 222 Santa Fe Dr., Denver, Colo.
Northern Indiana Brass Co., 935 Plum St., Elkhart, Ind.
Ohio Brass Co., N. Main St., Mansfield, O.
Ohio Injector Co., Wadsworth, O.
Ohio Pattern Wks. & Foundry Co., Eureka Valve Div., 2735 Colerain Ave., Cincinnati, O.
Ostlind Valve, Inc., Portland, Ore.
Parker Appliance Co., The, 17325 Euclid Ave., Cleveland, O.
Penberthy Injector Co., 1242 Holden Ave., Detroit, Mich.
Phoenix Brass Fittings Corp., Colt St. & Chancellor Ave., Irvington, N. J.
Pierce, Butler Radiator Corp., 701 Nichols Ave., Syracuse, N. Y.
Pittsburgh Valve & Fittings Corp., Barberton, O.
Powell Co., Wm., 2525 Spring Grove Ave., Cincinnati, O.
R-S Products Corp., Germantown Ave., at Wayne Junction, Philadelphia, Pa.
Reading-Pratt & Cady Div., American Chain & Cable Co., Inc., Tulpehocken St. & L. V. R. R., Reading, Pa.
Rensselaer Valve Co., Ontario St., Cohoes, N. Y.
Rockford Brass Works, 700 S. Main St., Rockford, Ill.
Ross Valve Mfg. Co., Inc., 6 Oakwood Ave., Troy, N. Y.
Ruggles-Klingemann Mfg. Co., 4 Foster Ct., Salem, Mass.
Schade Valve Mfg. Co., 2527 N. Bodine St., Philadelphia, Pa.
Schutte & Koerting Co., 12th & Thompson Sts., Philadelphia, Pa.
Scott Valve Mfg. Co., 3963 McKinley Ave., Detroit, Mich.
Semet-Solvay Engineering Corp., 40 Rector St., New York, N. Y.
Shank Co., Cyrus, 625 W. Jackson Blvd., Chicago, Ill.
Smolensky Valve Co., Inc., 1931 W. 47th St., Cleveland, O.
Spencer Thermostat Co., 43 Forest St., Attleboro, Mass.
Stack Heater Co., The, 250 Stuart St., Boston, Mass.
Staples & Pfeiffer, Ltd., 528 Bryant St., San Francisco, Cal.
Star Brass Mfg. Co., 108 E. Dedham St., Boston, Mass.
Sterling, Inc., 3738 N. Holton St., Milwaukee, Wis.
Stockham Pipe Fittings Co., 4100 Tenth Ave., N., Birmingham, Ala.
Strong, Carlisle & Hammond Co., The, 1392 W. Third St., Cleveland, O.
Swartwout Co., 18511 Euclid Ave., Cleveland, O.
Thrush & Co., H. A., 21 E. Riverside Dr., Peru, Ind.
Triplex Heating Specialty Co. Inc., 131 E. Canal St., Peru, Ind.
Triplex Mfg. Co., Peru, Ind.
Tryco Products, Inc., Railroad Sq., Westfield, Mass.
Walworth Co., 60 E. 42nd St., New York, N. Y.
Watson & McDaniel Co., 440 N. Marshall, Philadelphia, Pa.
Watson-Stillman Co., 140 Aldene Rd., Roselle, N. J.
Watts Regulator Co., 10 Embankment St., Lawrence, Mass.
Wheeler Mfg. Co., C. H., 19th, Lehigh & Sedgley Aves., Philadelphia, Pa.
White Flo-Matic Corp., 30 Elm St., Hoosick Falls, N. Y.
Williams Gauge Co., 1620 Pennsylvania Ave., N. S., Pittsburgh, Pa.
Williams Valve Co., D. T., Spring Grove Ave. & Township St., Cincinnati, O.
X L Refrigerating Co., 1834 W. 59th St., Chicago, Ill.

VALVES, STEAM & WATER
Diaphragm

Atlas Valve Co., Inc., 282 South St., Newark, N. J.
Belfield Co., H., 435 N. Broad St., Philadelphia, Pa.
Boylston Steam Specialty Co., 116-122 W. Illinois St., Chicago, Ill.
Bristol Co., Platts Ridge, Waterbury, Conn.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co.. 4535 Wayne Ave., Philadelphia, Pa.
Cash Co., A. W., P. O. Box 135, Decatur, Ill.
Chaplin-Fulton Mfg. Co., 28-40 Penn Ave., Pittsburgh, Pa.
Cooper Co., Clark, 159 Jefferson St., Philadelphia, Pa.
Davis Regulator Co., 2546 S. Washtenaw Ave., Chicago, Ill.
Defender Automatic Regulator Co., 308 S. 8th St., St. Louis, Mo.
Eclipse Fuel Engineering Co., 707 S. Main St., Rockford, Ill.
Electrimatic Corp., 2100 Indiana Ave., Chicago, Ill.
Fisher Governor Co., 201 S. First Ave., Marshalltown, Ia.
Foster Engineering Co., 109 Monroe St., Newark, N. J.
Foxboro Co., 106 Neponset Ave., Foxboro, Mass.
Friez & Sons, Julien P., 4 N. Central Ave., Baltimore, Md.
General Controls Co., 700 W. Ivy St., Glendale, Cal.
Golden-Anderson Valve Specialty Co., Fulton Bldg., Pittsburgh, Pa.
Illinois Engineering Co., 2035 S. Racine Ave., Chicago, Ill.
Johnson Service Co., 507 E. Michigan St., Milwaukee, Wis.
Kieley & Mueller Co., Inc., 40 W. 13th St., New York, N. Y.
Klipfel Mfg. Co., 2651 W. Harrison St., Chicago, Ill.
Locke Regulator Co., 76 North St., Salem, Mass.
Lonergan Co., J. E., 211 Race St., Philadelphia, Pa.
Mason-Neilan Regulator Co., 1190 Adams St., Boston, Mass.
McAlear Mfg. Co., 1901-1909 S. Western Ave., Chicago, Ill.
Milwaukee Valve Co., S. Burrell St. at E. Hayes Ave., Milwaukee, Wis.
Minneapolis-Honeywell Regulator Co., 2701 Fourth Ave., South, Minneapolis, Minn.
Mueller Brass Co., Lapeer Ave., Port Huron, Mich.
Mueller Co., Decatur, Ill.
Mueller Steam Specialty Co., Inc., 40-20 22nd St., Long Island City, N. Y.
Natural Gas Equipment Incorporated, 539 Petroleum Bldg., Los Angeles, Cal.
Parks-Cramer Co., 970 Main St., Fitchburg, Mass.
Perfex Corp. (Controls Div.), 500 W. Oklahoma Ave., Milwaukee, Wis.
Powell Co., Wm., 2525 Spring Grove Ave., Cincinnati, O.
Powers Regulator Co., 2720 Greenview Ave., Chicago, Ill.
Reading-Pratt & Cady Div., American Chain & Cable Co., Inc., Reading, Pa.
Ruggles-Klingemann Mfg. Co., 4 Foster Ct., Salem, Mass.
Schade Valve Mfg. Co., 2527 N. Bodine St., Philadelphia, Pa.
Schutte & Koerting Co., 12th and Thompson Sts., Philadelphia, Pa.
Spence Engineering Co., Inc., 28 Grant St., Walden, N. Y.

DEPENDABLE
A-P Model 204 Automatic Expansion Valve. ¼ ton Freon Capacity.
A-P Model 205-C Thermostatic Expansion Valve. 1 ton Freon Capacity.
A-P Model 206 Thermostatic Expansion Valve with Fixed Superheat.
A-P Model 207 Thermostatic Expansion Valve. ½ ton Freon.
A-P Model 208 Thermostatic Expansion Valve. 1 ton Freon Capacity.
A-P Model 215 Thermostatic Expansion Valve. 8 tons Freon to 12 tons Methyl.
A-P Model 226-H Thermostatic Expansion Valve. 1½ tons Freon to 32 tons Methyl
A-P Model No. 235 Suction Pressure Regulating Valve.
A-P Model 66 Series Thermostats for Heating or Cooling.
Buy DEPENDABLE PRODUCTS..
DEPENDABLE PRODUCTS
..WHERE YOU SEE THIS SIGN!
A-P Model 70-HA Refrigerant Solenoid Valve. 17.5 tons Freon Capacity.
A-P Model 70-H Refrigerant Solenoid Valve. 48 tons Freon Capacity.
A-P Model 71-J Solenoid Water Valve. ⅜" or ½" orifice.
A-P Model 73-RJ Solenoid Refrigerant Valve. ⅛" or ¼" orifice.
A-P Model 270 Solenoid Refrigerant Valve. 18.5 tons Freon.
A-P Model 66 Solenoid Operated Water Valve. Capacity 2070 Gallons Per Hr.
A-P "TRAP-IT" System-Protector. Stops impurities and MOISTURE.
A-P Model 68 Series Water Regulating Valve. ⅜"-½"-¾" Pipe Sizes. Raw lead stroke gives extremely close, uniform control.
VALVE INSULATOR Sponge Rubber Cover Prevents Sweating and Freezing of Expansion Valves.
★ Progressive Service Engineers Use and Recommend — and Aggressive Jobbers Stock and Talk — Products.
AUTOMATIC PRODUCTS COMPANY
2462 NORTH THIRTY — SECOND STREET
MILWAUKEE WISCONSIN
Export Department, 100 Varick Street, New York City

Staples & Pfeiffer, Ltd., 528 Bryant St., San Francisco, Cal.
Strong, Carlisle & Hammond Co., The, 1392 W. Third St., Cleveland, O.
Swartwout Co., 18511 Euclid Ave., Cleveland, O.
Tagliabue Mfg. Co., C. J., 540 Park Ave., Brooklyn, N. Y.
Taylor Instrument Companies, 95 Ames St., Rochester, N. Y.
Trane Co., The, La Crosse, Wis.
Trerice Co., H. O., 1420 W. Lafayette Blvd., Detroit, Mich.
Watson & McDaniel Co., 440 N. Marshall, Philadelphia, Pa.
Watts Regulator Co., 10 Embankment St., Lawrence, Mass.

VALVES, STEAM & WATER
Float

Atlas Valve Co., Inc., 282 South St., Newark, N. J.
Baker Ice Machine Co. Inc., 1508 Evans St., Omaha, Neb.
Belfield Co., H., 435 N. Broad St., Philadelphia, Pa.
Boylston Steam Specialty Co., 116-122 W. Illinois St., Chicago, Ill.
Caldwell Co., W. E., 2120 Brook St., Louisville, Ky.
Cash Co., A. W., P. O. Box 135, Decatur, Ill.
Central Brass Mfg. Co., 2950 E. 55th St., Cleveland, O.
Chase Brass & Copper Co., 236 Grand St., Waterbury, Conn.
Cooper Co., Clark, 159 Jefferson St., Philadelphia, Pa.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Darling Valve & Mfg. Co., 701 First St., Williamsport, Pa.
Defender Automatic Regulator Co., 308 S. 8th St., St. Louis, Mo.
Eclipse Fuel Engineering Co., 707 S. Main St., Rockford, Ill.
Fisher Governor Co., 201 S. First Ave., Marshalltown, Ia.
Foster Engineering Co., 109 Monroe St., Newark, N. J.
Golden-Anderson Valve Specialty Co., Fulton Bldg., Pittsburgh, Pa.
Hasco Valve & Machine Co., 1819 W. St. Paul Ave., Milwaukee, Wis.
Illinois Engineering Co., 2035 S. Racine Ave., Chicago, Ill.
Imperial Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.
Kieley & Mueller Co., Inc., 40 W. 13th St., New York, N. Y.
Klipfel Mfg. Co., 2651 W. Harrison St., Chicago, Ill.
Locke Regulator Co., 76 North St., Salem, Mass.
Ludlow Valve Mfg. Co., Foot of Adams St., Troy, N. Y.
Luzerne Rubber Co., Muirhead Ave., Trenton, N. J.
Maid-O'-Mist, Inc., 215 N. Aberdeen St., Chicago, Ill.
Mason-Neilan Regulator Co., 1190 Adams St., Boston, Mass.
McAlear Mfg. Co., 1901-1909 S. Western Ave., Chicago, Ill.
McDonnell & Miller, 400 N. Michigan Ave., Chicago, Ill.
Milwaukee Valve Co., S. Burrell St. at E. Hayes Ave., Milwaukee, Wis.
Monash-Younker Co., 1315 W. Congress St., Chicago, Ill.
Mueller Brass Co., Lapeer Ave., Port Huron, Mich.
Mueller Steam Specialty Co., Inc., 40-20 22nd St., Long Island City, N. Y.
Northern Indiana Brass Co., 935 Plum St., Elkhart, Ind.
Reading-Pratt & Cady Div., American Chain & Cable Co., Inc., Reading, Pa.
Rockford Brass Works, 700 S. Main St., Rockford, Ill.
Ross Valve Mfg. Co., Inc., 6 Oakwood Ave., Troy, N. Y.
Ruggles-Klingemann Mfg. Co., 4 Foster Ct., Salem, Mass.
Schade Valve Mfg. Co., 2527 N. Bodine St., Philadelphia, Pa.
Schutte & Koerting Co., 12th and Thompson Sts., Philadelphia, Pa.
Spence Engineering Co., Inc., 28 Grant St., Walden, N. Y.
Stickle Steam Specialties Co., 2215 Valley Ave., Indianapolis, Ind.
Swartwout Co., 18511 Euclid Ave., Cleveland, O.
Trane Co., The, La Crosse, Wis.
Viking Air Conditioning Corp., 9500 Richmond Ave., Cleveland, O.

VALVES, STEAM & WATER
Mixing

Atlantic Valve & Pump Co., 4045 W. Kinzie St., Chicago, Ill.
Baker Ice Machine Co. Inc., 1508 Evans St., Omaha, Neb.
Bell & Gossett Co., 3000 Wallace St., Chicago, Ill.
Boiler Room Equipment, Inc., 45 W. 45th St., New York, N. Y.
Central Brass Mfg. Co., 2950 E. 55th St., Cleveland, O.
Cooper Co., Clark, 159 Jefferson St., Philadelphia, Pa.
Fulton Sylphon Co., Knoxville, Tenn.
General Fittings Co., 123 Georgia Ave., Providence, R. I.
Johnson Service Co., 507 E. Michigan St., Milwaukee, Wis.
Lawler Automatic Controls, Inc., 453 N. MacQuesten Pkwy., Mount Vernon, N. Y.
Leonard Valve Co., Elmwood Station, Providence, R. I.
Leslie Co., Valley Brook & Grant Aves., Lyndhurst, N. J.
Pfening Co., Fred D., The, 1075 W. 5th Ave., Columbus, O.
Powers Regulator Co., 2720 Greenview Ave., Chicago, Ill.
Sarco Co., Inc., 183 Madison Ave., New York, N. Y.
Schutte & Koerting Co., 12th and Thompson Sts., Philadelphia, Pa.
Sterling, Inc., 3738 N. Holton St., Milwaukee, Wis.
Thermo-Mix, Inc., 40-09 21st St., Long Island City, N. Y.
Thrush & Co., H. A., 21 E. Riverside Dr., Peru, Ind.
Vapor Car Heating Co., Inc., 80 E. Jackson Blvd., Chicago, Ill.

VALVES, STEAM & WATER
Motor-Operated

Au-Temp-Co Corp., 1 Park Ave., New York, N. Y.
Automatic Temperature Control Co., Inc., 22 E. Logan St., Philadelphia, Pa.
Baker Ice Machine Co. Inc., 1508 Evans St., Omaha, Neb.
Barber-Colman Co., 225 Loomis St., Rockford, Ill.
Bell & Gossett Co., 3000 Wallace St., Chicago, Ill.
Boylston Steam Specialty Co., 116-122 W. Illinois St., Chicago, Ill.
Bristol Co., Platts Bridge, Waterbury, Conn.
Brooke Engineering Co., Inc., 4517 Wayne Ave., Philadelphia, Pa.
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., 4534 Wayne Ave., Philadelphia, Pa.
Chapman Valve Mfg. Co., The, 203 Hampshire St., Indian Orchard, Mass.
Cooper Co., Clark, 159 Jefferson St., Philadelphia, Pa.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Cutler-Hammer, Inc., N. 12th St. and W. St. Paul Ave., Milwaukee, Wis.
Darling Valve & Mfg. Co., 701 First St., Williamsport, Pa.
Davis Regulator Co., 2546 S. Washtenaw Ave., Chicago, Ill.
Edward Valve & Mfg. Co., Inc., 1200 W. 145th St., East Chicago, Ind.
Fairbanks Co., 396 Lafayette St., New York, N. Y.
Foxboro Co., 106 Neponset Ave., Foxboro, Mass.
General Controls Co., 700 W. Ivy St., Glendale, Cal.
General Electric Co., Lamp Dept., Nela Park, Cleveland, O.
Hasco Valve & Machine Co., 1819 W. St. Paul Ave., Milwaukee, Wis.
Homestead Valve Mfg. Co., P. O. Box 348, Coraopolis, Pa.
Illinois Engineering Co., 2035 S. Racine Ave., Chicago, Ill.
Jenkins Bros., 80 White St., New York, N. Y.
Kennedy Valve Mfg. Co., The, Elmira, N. Y.
Kieley & Mueller, Inc., 40 W. 13th St., New York, N. Y.
Klipfel Mfg. Co., 2651 W. Harrison St., Chicago, Ill.
Leslie Co., Valley Brook & Grant Aves., Lyndhurst, N. J.
Ludlow Valve Mfg. Co., Foot of Adams St., Troy, N. Y.
Lunkenheimer Co., Waverly & Beekman Sts., Cincinnati, O.
Mason-Neilan Regulator Co., 1190 Adams St., Boston, Mass.
McAlear Mfg. Co., 1901-1909 S. Western Ave., Chicago, Ill.
Mercoid Corp., The, 4201 Belmont Ave., Chicago, Ill.
Minneapolis-Honeywell Regulator Co., 2701 Fourth Ave., South, Minneapolis, Minn.
Natural Gas Equipment Incorporated, 539 Petroleum Bldg., Los Angeles, Cal.
Perfex Corp. (Control Div.), 500 W. Oklahoma Ave., Milwaukee, Wis.
Powell Co., Wm., 2525 Spring Grove Ave., Cincinnati, O.
R-S Products Corp., Germantown Ave. at Wayne Junction, Philadelphia, Pa.
Reading-Pratt & Cady Div., American Chain & Cable Co., Inc., Tulpehocken St. & L. V. R. R., Reading, Pa.
Ruggles-Klingemann Mfg. Co., 4 Foster Ct., Salem, Mass.
Sarco Co., Inc., 183 Madison Ave., New York, N. Y.
Schutte & Koerting Co., 12th and Thompson Sts., Philadelphia, Pa.
Shallcross Controls, Inc., 121 N. Broadway, Milwaukee, Wis.
Sterling, Inc., 3738 N. Holton St., Milwaukee, Wis.
Tallmadge & Co., Webster, 255 N. 18th St., East Orange, N. J.
Taylor Instrument Companies, 95 Ames St., Rochester, N. Y.
Trerice Co., H. O., 1420 W. Lafayette Blvd., Detroit, Mich.
Vapor Car Heating Co., Inc., 80 E. Jackson Blvd., Chicago, Ill.
Vogt Machine Co., Henry, 10th & Ormsby Sts., Louisville, Ky.
Walworth Co., 60 E. 42nd St., New York, N. Y.
Webster & Co., Warren, 17th & Federal Sts., Camden, N. J.

VALVES, STEAM & WATER
Pressure Reducing and Regulating

American District Steam Co., Bryant St., North Tonawanda, N. Y.
American Injector Co., 1481—14th St., Detroit, Mich.
Atlas Valve Co., Inc., 282 South St., Newark, N. J.
Bailey Meter Co., 1050 Ivanhoe Rd., Cleveland, O.
Baker Ice Machine Co. Inc., 1508 Evans St., Omaha, Neb.
Belfield Co., H., 435 N. Broad St., Philadelphia, Pa.
Bell & Gossett Co., 3000 Wallace St., Chicago, Ill.
Boylston Steam Specialty Co., 116-122 W. Illinois St., Chicago, Ill.
Brooke Engineering Co., Inc., 4517 Wayne Ave., Philadelphia, Pa.
Cash Co., A. W., P. O. Box 135, Decatur, Ill
Cash Universal Regulator Co., Marshalltown, Ia.
Central Brass Mfg. Co., 2950 E. 55th St., Cleveland, O.
Chaplin-Fulton Mfg. Co., 28-40 Penn Ave., Pittsburgh, Pa.
Clees Valve & Engineering Co., 90 West St., New York, N. Y.
Cooper Co., Clark, 159 Jefferson St., Philadelphia, Pa.
Crane Co., 838 S. Michigan Ave., Chicago, Ill.
Davis Regulator Co., 2546 S. Washtenaw Ave., Chicago, Ill.
Defender Automatic Regulator Co., 308 S. 8th St., St. Louis, Mo.
Diamond Castings Co., Terra Cotta Rd., Johnsonburg, Pa.
Dunham Co., C. A., 450 E. Ohio St., Chicago, Ill.
Eclipse Fuel Engineering Co., 707 S. Main St., Rockford, Ill.
Electrimatic Corp., 2100 Indiana Ave., Chicago, Ill.
Fisher Governor Co., 201 S. First St., Marshalltown, Ia.
Foster Engineering Co., 109 Monroe St., Newark, N. J.
Golden-Anderson Valve Specialty Co., Fulton Bldg., Pittsburgh, Pa.
Grove Regulator Co., 1729 Poplar St., Oakland, Cal.
Herske & Timmis, Inc., 33 W. 60th St., New York, N. Y.
Illinois Engineering Co., 2035 S. Racine Ave., Chicago, Ill.
Kainer & Co., 761 W. Lexington, Chicago, Ill.
Keckley Co., O. C., 400 W. Madison St., Chicago, Ill.
Kieley & Mueller, Inc., 40 W. 13th St., New York, N. Y.
Klingerit, Inc., 16-22 Hudson St., New York, N. Y.
Klipfel Mfg. Co., 2651 W. Harrison St, Chicago, Ill.
Leslie Co., Valley Brook & Grant Aves., Lyndhurst, N. J.
Locke Regulator Co., 76 North St., Salem, Mass.
Mason-Neilan Regulator Co., 1190 Adams St., Boston, Mass.
Maid-O'-Mist, Inc., 215 N. Aberdeen St., Chicago, Ill.
McAlear Mfg. Co., 1901-1909 S. Western Ave., Chicago, Ill.
Monmouth Products Co., 1929-41 E. 61st Sts., Cleveland, O.
Mueller Co., Decatur, Ill.
Mueller Steam Specialty Co., Inc., 40-20 22nd St., Long Island City, N. Y.
Norgren Co., Inc., C. A., 222 Santa Fe Dr., Denver, Colo.
Parker Appliance Co., 17325 Euclid Ave., Cleveland, O.
Perfection Refrigeration Parts Co., Harvey, Ill.
Powers Regulator Co., The, 2729 Greenview Ave., Chicago, Ill.
Reading-Pratt & Cady Div., American Chain & Cable Co., Inc., Reading, Pa.
Republic Flow Meters Co., 2240 Diversey Pkwy. Chicago, Ill.
Ross Valve Mfg. Co., Inc., 6 Oakwood Ave., Troy, N. Y.
Ruggles-Klingemann Mfg. Co., 4 Foster Ct., Salem, Mass.
Schade Valve Mfg. Co., 2527 N. Bodine St., Philadelphia, Pa.
Schutte & Koerting Co., 12th and Thompson Sts., Philadelphia, Pa.
Shallcross Controls, Inc., 121 N. Broadway, Milwaukee, Wis.
Spence Engineering Co., Inc., 28 Grant St., Walden, N. J.
Squires Co., C. E., E. 40th St. & Kelley Ave., Cleveland, O.
Stack Heater Co., The, 250 Stuart St., Boston, Mass.
Staples & Pfeiffer, Ltd., 528 Bryant St., San Francisco, Cal.
Sterling Engineering Co., 3738 N. Holton St., Milwaukee, Wis.
Stickle Steam Specialties Co., 2215 Valley Ave., Indianapolis, Ind.
Strong, Carlisle & Hammond Co., The, 1392 W. Third St., Cleveland, O.
Swartwout Co., 18511 Euclid Ave., Cleveland, O.
Tagliabue Mfg. Co., C. J., 540 Park Ave., Brooklyn, N. Y.
Taylor Instrument Companies, 95 Ames St., Rochester, N. Y.
Thrush & Co., H. A., Peru, Ind.
Trane Co., The, La Crosse, Wis.
Trerice Co., H. O., 1420 W. Lafayette Blvd., Detroit, Mich.
Triplex Mfg. Co., Peru, Ind.
Tryco Products, Inc., Railroad Sq., Westfield, Mass.
Vapor Car Heating Co., Inc., 80 E. Jackson Blvd., Chicago, Ill.
Watson & McDaniel Co., 440 N. Marshall, Philadelphia, Pa.
Watts Regulator Co., 10 Embankment St., Lawrence, Mass.
Webster & Co., Warren, 17th & Federal Sts., Camden, N. J.
White Flo-Matic Corp., 30 Elm St., Hoosick Falls, N. Y.

VALVES, 2, 3, and 4 WAY

American Brass Co., 414 Meadow St., Waterbury, Conn.
Barber-Colman Co., 225 Loomis St., Rockford, Ill.
Belfield Co., H., 435 N. Broad St., Philadelphia, Pa.
Bordo Co., Inc., L. J., 115 New St., Glenside, Pa.

Bristol Co., Platts Bridge, Waterbury, Conn.
Cash Co., A. W., P. O. Box 135, Decatur, Ill.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Davis Engineering Co., 1064 E. Grand St., Elizabeth, N. J.
Davis Regulator Co., 2546 S. Washtenaw Ave., Chicago, Ill.
Detroit Lubricator Co., 5900 Trumbull Ave., Detroit, Mich.
Eddy Valve Company, Waterford, New York.
General Controls Co., 700 W. Ivy St., Glendale, Cal.
Golden-Anderson Valve Specialty Co., Fulton Bldg., Pittsburgh, Pa.
Henry Valve Co., 1019 N. Spaulding Ave., Chicago, Ill.
Homestead Valve Mfg. Co., P. O. Box 348, Coraopolis, Pa.
Imperial Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.
Inland Mfg. Co., 1120 N. Cicero Ave., Chicago, Ill.
Jarecki Mfg. Co., 1345 W. 12th St., Erie, Pa.
Johnson Service Co., 507 E. Michigan St., Milwaukee, Wis.
Kerotest Mfg. Co., 2525 Liberty Ave., Pittsburgh, Pa.
Lunkenheimer Co., Waverly & Beekman Sts., Cincinnati, O.
Luzerne Rubber Co., Muirhead Ave., Trenton, N. J.
Merco-Nordstrom Valve Co., 400 N. Lexington Ave., Pittsburgh, Pa.
Mercoid Corp., The, 4201 Belmont Ave., Chicago, Ill.
Minneapolis-Honeywell Regulator Co., 2701 Fourth Ave., South, Minneapolis, Minn.
Mueller Brass Co., Port Huron, Mich.
Nicholson & Co., H. W., 12 Oregon St., Wilkes-Barre, Pa.
Parker Appliance Co., The, 17325 Euclid Ave., Cleveland, O.
Powell Co., Wm., 2525 Spring Grove Ave., Cincinnati, O.
Ruggles-Klingemann Mfg. Co., 4 Foster Ct., Salem, Mass.
Schutte & Koerting Co., 12th & Thompson Sts., Philadelphia, Pa.
Semet-Solvay Engineering Corp., 40 Rector St., New York, N. Y.
Smolensky Valve Co., Inc., 1931 W. 47th St., Cleveland, O.
Spence Engineering Co., Inc., 28 Grand St.., Walden, N. Y.
Taylor Instrument Companies, 95 Ames St., Rochester, N. Y.
Walworth Co., 60 E. 42nd St., New York, N. Y.
Weatherhead Co., 300 E. 131st St., Cleveland, O.
Williams Valve Co., D. T., Spring Grove Ave. & Township St., Cincinnati, O.

VANES, DUCT TURNING

Barber-Colman Co., 225 Loomis St., Rockford, Ill.
Milcor Steel Co., S. 41st & Burnham Sts., Milwaukee, Wis.
Tuttle & Bailey, Inc., Corbin Ave., New Britain, Conn.
Waterloo Register Co., 2520 E. 4th St., Waterloo, Ia.

VAPOR SYSTEMS

(See Heating Systems, Vapor)

V-BELTS

(See Belts, V-Type)

VENTILATORS

Mushroom

Aeolus Dickinson Co., 3320 S. Artesian Ave., Chicago, Ill.
Best Register Co., 2005 W. Oklahoma Ave., Milwaukee, Wis.
Bros Boiler & Mfg. Co., Wm., Nicollet Island, Minneapolis, Minn.
Falstrom Co., Main Ave. & D. L. & W. R. R., Passaic, N. J.
Industrial Sheet Metal Works, 628 E. Forest Ave., Detroit, Mich.
Knowles Mushroom Ventilator Co., 11 Label St., Montclair, N. J.
Milcor Steel Co., S. 41st & Burnham Sts., Milwaukee, Wis.
Mueller Furnace Co., L. J., 2005 W. Oklahoma Ave., Milwaukee, Wis.
Penn Ventilating Co., 2812 Richmond St., Philadelphia, Pa.
Tuttle & Bailey, Inc., Corbin Ave., New Britain, Conn.
Ventilating Products Co., 2800 Cottage Grove Ave., Chicago, Ill.

VENTILATORS

Roof, Fan

Aeolus Dickinson Co., 3320 S. Artesian Ave., Chicago, Ill.
Air Controls, Inc., 9205 Detroit Ave., Cleveland, O.
Airmaster Corp., 4317 Ravenswood Ave., Chicago, Ill.
Allen Corp., 9767 Erwin Ave., Detroit, Mich.
American Coolair Corp., 3604 Mayflower St., Jacksonville, Fla.
American-Larson Ventilating Co., 1004 Keystone Bank Bldg., Pittsburgh, Pa.
Arex Co., 333 N. Michigan Ave., Chicago, Ill.
Autovent Fan & Blower Co., 1811-27 N. Kostner Ave., Chicago, Ill.
Belanger Fan & Blower Co., 1230 18th St., Detroit, Mich.
Bros Boiler & Mfg. Co., Wm., Nicollett Island, Minneapolis, Minn.
Buffalo Forge Co., 171 Mortimer St., Buffalo, N. Y.
Burt Mfg. Co., 635 Main St., Akron, O.
California Cornice, Steel & Supply Co., 1620 N. Spring St., Los Angeles, Cal.
Century Fan & Ventilator Co., 292 Locust Ave., New York, N. Y.
Chelsea Fan & Blower Co., 370 W. 15th St., New York, N. Y.
Clay Equipment Corp., Cedar Falls, Ia.
Davidson Fan Co., 213 California St., Newton, Mass.
De Bothezat Ventilating Equipment Div., American Machine & Metals, Inc., East Moline, Ill.
Economy Electric Mfg. Co., 4606 W. 21st St., Chicago, Ill.
Electrovent Fan & Mfg. Co., 812 W. Lake St., Chicago, Ill.
Emerson Electric Mfg. Co., 1847 Washington Ave., St. Louis, Mo.
Falstrom Co., Main Ave., & D.L. & W.R.R., Passaic, N. J.
Fingles Co., The, Reistertown Rd. at Elgin Ave., Baltimore, Md.
Gehri Co., 1117 Tacoma Ave., Tacoma, Wash.
General Regulator Corp., 2608 Arthington St., Chicago, Ill.
Goethel Co., Alfred C., 2337 N. 31st St., Milwaukee, Wis.
Grand Rapids Blow Pipe & Dust Arrester Corp., 525-28 Monroe Ave., Grand Rapids, Mich.
Hirschman Co., W. F., 1245 McKinley Parkway, Buffalo. N. Y.
Howes Co., S. M., 511 Medford St., Charlestown District, Boston, Mass.
Ilg Electric Ventilating Co., 2850 N. Crawford Ave., Chicago, Ill.
Industrial Sheet Metal Wks., Inc., 628 E. Forest Ave., Detroit, Mich.
International Engineering, Inc., 1145 Bolander Ave., Dayton, O.
Iona Ventilator Co., Inc., 2821-29 W. Dauphin St., Philadelphia, Pa.
Johnson Fan & Blower Corp., 1320 W. Lake St., Chicago, Ill.
Jordan & Co., Paul R., 631 S. Delaware St., Indianapolis, Ind.
Kernchen Co., 103 E. Wacker Dr., Chicago, Ill.
Klauer Mfg. Co., Dubuque, Iowa.
Lohman, Inc., Wm. J., 62 Ninth Ave., New York, N. Y.
McCord Radiator & Mfg. Co., 2587 E. Grand Blvd., Detroit, Mich.
Milcor Steel Co., S. 41st & Burnham Sts., Milwaukee, Wis.
Myers Electric Co., 410 Third Ave., Pittsburgh, Pa.
Nugent Sons, Inc., Thos., 223 E. 80th St., New York, N. Y.
Penn Ventilating Co., 2812 Richmond St., Philadelphia, Pa.
Propellair, Inc., 1345 Lagonda Ave., Springfield, O.
Reed Unit-Fans, Inc., 811 St. Charles St., New Orleans, La.
Robertson Co., H. H., 2000 Grant Bldg., Pittsburgh, Pa.
Robbins & Myers, Inc., Lagonda Ave., Springfield, O.
Royal Ventilator Co., 415 Locust St., Philadelphia, Pa.
Sturtevant Co., B. F., Damon St., Hyde Park, Boston, Mass.
Swartwout Co., 18511 Euclid Ave., Cleveland, O.
Trade-Wind Motor Fans, Inc., 1325 Maple Ave., Los Angeles, Cal.
U. S. Air Conditioning Corp., 2101 Kennedy St., N. E., Minneapolis, Minn.
Uno Ventilator Co., 565 Lincoln Ave., Cliftondale, Mass.
Utility Fan Corp., 2528 Santa Fe Ave., Los Angeles, Cal.
Viking Air Conditioning Corp., 9500 Richmond Ave., Cleveland, O.
Washburne & Co., E. G., 207 Fulton St., New York, N. Y.
Western Engineering & Mfg. Co., 1726 E. Washington Blvd., Los Angeles, Cal.
Wing Mfg. Co., L. J., 158 West 14th St., New York, N. Y.

VENTILATORS

Roof, Gravity

Accurate Mfg. Works, 2336-38 Milwaukee Ave., Chicago, Ill.
Aeolus Dickinson Co., 3320 S. Artesian Ave., Chicago, Ill.
Airtherm Mfg. Co., 700 S. Spring Ave., St. Louis, Mo.
Allen Co., E. H., 22 Dorrance St., Boston, Mass.
Allen Corp., 9767 Erwin Ave., Detroit, Mich.
American Foundry & Furnace Co., Washington St. at McClun, Bloomington, Ill.
American-Larson Ventilating Co., 1004 Keystone Bank Bldg., Pittsburgh, Pa.
American Sheet Metal Works, 331 N. Alexander, New Orleans, La.
Ames Co., W. R., 150 Hooper St., San Francisco, Cal.
Anderson Mfg. Co., 511 Third, Des Moines, Ia.
Arex Co., 333 N. Michigan Ave., Chicago, Ill.
Autoforce Ventilating System, 244 Washington St., Boston, Mass.
Berger Bros. Co., 229-237 Arch St., Philadelphia, Pa.
Bros Boiler & Mfg. Co., Wm., Nicollet Island, Minneapolis, Minn.
Burt Mfg. Co., 625 Main St., Akron, O.
Century Fan & Ventilating Co., 292 Locust Ave., New York, N. Y.
Chicago Metal Mfg. Co., 3724 S. Rockwell St., Chicago, Ill.
Cincinnati Sheet Metal & Roofing Co., 230 E. Front St., Cincinnati, O.
Clay Equipment Corp., Cedar Falls, Ia.
Day Co., The, 2938 Pillsbury Ave., Minneapolis, Minn.
Edwards Mfg. Co., Inc., 337 Eggleston Ave., Cincinnati, O.
Falstrom Co., Main Ave., & D.L. & W.R.R., Passaic, N. J.
Fingles Co., The, Reistertown Rd., at Elgin Ave., Baltimore, Md.
Gehri Co., 1117 Tacoma Ave., Tacoma, Wash.
Goethel Co., Alfred C., 2337 N. 31st St., Milwaukee, Wis.
Grand Rapids Blow Pipe & Dust Arrester Corp., 525-28 Monroe Ave., Grand Rapids, Mich.
Hirschman Co., W. F., 1245 McKinley Parkway, Buffalo. N. Y.
Howes Co., S. M., 511 Medford St., Charlestown District, Boston, Mass.
Hudson Equipment Corp., 324 Third Ave., N., Minneapolis, Minn.
Industrial Sheet Metal Wks., Inc., 628 E. Forest Ave., Detroit, Mich.
International Steel Co., 1545 Edgar St., Evansville, Ind.
Iona Ventilator Co., Inc., 2821-29 W. Dauphin St., Philadelphia, Pa.
Ivan Brothers, 1503 Prairie Ave., South Bend, Ind.
Janar Co., Walker, 367 S. First Ave., E. Duluth, Minn.
Johns-Manville, 22 E. 40th St., New York, N. Y.
Jordan & Co., Paul R., 631 S. Delaware St., Indianapolis, Ind.
Kernchen Co., 103 E. Wacker Dr., Chicago, Ill.
King Ventilating Co., Box 178, Owatonna, Minn.
Klauer Mfg. Co., Dubuque, Iowa.
Kleenaire Corp., 409 Jefferson St., Stevens Point, Wis.
Lamneck Products, Inc., 905 Cremo St., Middletown, O.
Lee & Son Co., Thomas, 128-132 W. Second St., Cincinnati, O.
Levow, David, 308 W. 20th St., New York, N. Y.
Martin Metal Mfg. Co, 900 E. Second St., Wichita, Kan.
Mellish & Murray Co., 1715 Carroll Ave., Chicago, Ill.
Merchant & Evans Co., 2035 Washington Ave., Philadelphia, Pa.
Meyer & Bro. Co., F., 1313 S. Adams St., Peoria, Ill.
Milcor Steel Co., S. 41st & Burnham Sts., Milwaukee, Wis.
Norman Sheet Metal Mfg. Co., W. F., 212-236 N. Cedar St., Nevada, Mo.
Osborn Co., The, J. M. & L. A., 1541 E. 38th St., Cleveland, O.
Patten Co., J. V., 500 De Kalb Ave., Sycamore, Ill.
Penn Ventilating Co., 2812 Richmond St., Philadelphia, Pa.
Pioneer Roofing & Sheet Metal Co., 226 N. Main St., Muskogee, Okla.
Puhl & Hepper Mfg. Co., Inc., 6400 W. Florissant Ave., St. Louis, Mo.
Robertson Co., H. H., 2000 Grant Bldg., Pittsburgh, Pa.
Royal Ventilator Co., 415 Locust St., Philadelphia, Pa.
Rynicker Sheet Metal Works, Inc., 122-4 N. 25th St., Billings, Mont.
St. Paul Corrugating Co., Wabash and Water Sts., St. Paul, Minn.
Schoedinger, F. O., 322-358 Mt. Vernon Ave., Columbus, O.
Southbridge Roofing Co., Inc., Hartwell and Chapin Sts., Southbridge, Mass.
Southern States Iron Roofing Co., Stiles Ave., Savannah, Ga.
Swartwout Co., 18511 Euclid Ave., Cleveland, O.
Tierney Rotor Ventilator Co., 239 Fourth Ave., S., Minneapolis, Minn.
Tiffin Art Metal Co., Broad and Second Ave., Tiffin, O.
Uno Ventilator Co., 565 Lincoln Ave., Cliftondale, Mass.
Van Noorden Co., E., 100 Magazine St., Boston, Mass.
Western Engineering & Mfg. Co., 1726 E. Washington Blvd., Los Angeles, Cal.
Willis Mfg. Co., Inc., 156 N. Academy St., Galesburg, Ill.
York Corrugating Co., Adams St. & W. M. R. R., York, Pa.

VENTILATORS, WINDOW

(See Window Ventilators)

VENTS, AIR

For Mains, Risers, Coils

Anderson Co., V. D., The, 1949 W. 96th St., Cleveland, O.
Anderson Products, Inc., 17 Tudor St., Cambridge, Mass.
Barnes & Jones, Inc., 160 Brookside Ave., Boston, Mass.
Beaton & Cadwell Mfg. Co., The, New Britain, Conn.
Beaton & Corbin Mfg. Co., Southington, Conn.
Bell & Gossett Co., 3000 Wallace St., Chicago, Ill.
Bishop & Babcock Sales Co., 4901-4915 Hamilton Ave., N. E., Cleveland, O.

Bros Boiler & Mfg. Co., Wm., Nicollet Island, Minneapolis, Minn.
Burnham Boiler Corp., Main St., Irvington, N. Y.
Chandler Co., 804 First Ave., N. W., Cedar Rapids, Ia.
Detroit Lubricator Co., 5900 Trumbull Ave., Detroit, Mich.
Dole Valve Co., 1901-41 Carroll Ave., Chicago, Ill.
Fulton Sylphon Co., Knoxville, Tenn.
Gorton Heating Corp., Cranford, N. J.
Grinnell Co., Inc., 260 W. Exchange St., Providence, R. I.
Hoffman Specialty Co., Inc., Waterbury National Bank Bldg., Waterbury, Conn.
Illinois Engineering Co., 2035 S. Racine Ave., Chicago, Ill.
Little Mfg. Co., M. S., 151 New Park Ave., Hartford, Conn.
Maid-O'-Mist, Inc., 215 N. Aberdeen St., Chicago, Ill.
McAlear Mfg. Co., 1901-07 S. Western Ave., Chicago, Ill.
Milcor Steel Co., S. 41st & Burnham Sts., Milwaukee, Wis.
Milwaukee Valve Co., S. Burrell St. at E. Hayes Ave., Milwaukee, Wis.
Mouat Vapor Heating Co., 1246 W. 4th St., Cleveland, O.
Mueller Steam Specialty Co., 40-20 22nd St., Long Island City, N. Y.
National Metal Products Corp., 21 N. Sheldon St., Chicago, Ill.
New York Air Valve Corp., 611-621 Broadway, New York, N. Y.
Russell & Co., W. A., Bridgeport, Conn.
Slater Mfg. Co., The, 24 Water St., Wakefield, Mass.
Sterling, Inc., 3738 N. Holton St., Milwaukee, Wis.
Trane Co., The, La Crosse, Wis.
Vapor Specialty Co., 101 W. 42nd St., New York, N. Y.
Wright-Austin Co., 315 W. Woodbridge St., Detroit, Mich.

VENTS, AIR
For Radiators

Anderson Products, Inc., 17 Tudor St., Cambridge, Mass.
Au-Temp-Co Corp., 1 Park Ave., New York, N. Y.
Beaton & Cadwell Mfg. Co., The, New Britain, Conn.
Burnham Boiler Corp., Main St., Irvington, N. Y.
Chicago Specialty Mfg. Co., 332 N. Western Ave., Chicago, Ill.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Detroit Lubricator Co., 5900 Trumbull Ave., Detroit, Mich.
Dole Valve Co., 1901-41 Carroll Ave., Chicago, Ill.
Gorton Heating Corp., Cranford, N. J.
Hoffman Specialty Co., Inc., Waterbury National Bank Bldg., Waterbury, Conn.
Jarecki Mfg. Co., 1345 W. 12th St., Erie, Pa.
Jenkins Bros., 80 White St., New York, N. Y.
Keeney Mfg. Co., Main St., Newington, Conn.
Little Mfg. Co., M. S., 151 New Park Ave., Hartford, Conn.
Logan Electric Specialty Mfg. Co., 412 S. Market St., Chicago, Ill.
Maid-O'-Mist, Inc., 215 N. Aberdeen St., Chicago, Ill.
Marsh, Corp., Jas. P., 2089 Southport Ave., Chicago, Ill.
McAlear Mfg. Co., 1901-09 S. Western Ave., Chicago, Ill.
Monash-Younker Co., 1315 W. Congress St., Chicago, Ill.
Murdock Mfg. & Supply Co., 426-30 Plum St., Cincinnati, O.
National Metal Products Corp., 21 N. Loomis St., Chicago, Ill.
New York Air Valve Corp., 611-621 Broadway, New York, N. Y.
Ohio Brass Co., N. Main St., Mansfield, O.
Raymond Co., F. I., 629 W. Washington Blvd., Chicago, Ill.
Russell & Co., W. A., Bridgeport, Conn.
Scovill Mfg. Co., Waterville, Div., Waterville, Conn.
Slater Mfg. Co., The, 24 Water St., Wakefield, Mass.
Sullivan Valve & Engineering Co., 910 S. Arizona St., Butte, Mont.
Vapor Specialty Co., 101 W. 42nd St., New York, N. Y.
Waterloo Register Co., 600 Anita St., Waterloo, Ia.

VIBRATION ISOLATORS
(See Base Pads)

WARM AIR FURNACES
(See Furnaces, Forced Warm Air)

WASHERS, AIR
(See Air Washers)

WATER COOLERS
(See Coolers, Water)

WATER CUT-OFFS
(See Boiler Cut-Offs)

WATER FEEDERS
(See Feeders, Boiler)

WATER HEATERS
(See Heaters, Water)

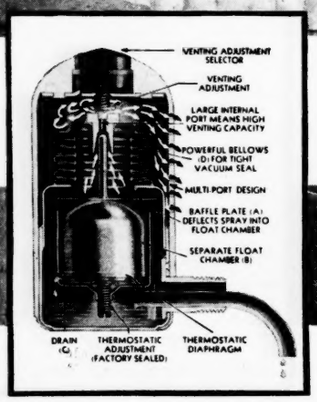
WATER TREATMENT
Allis-Chalmers Mfg. Co., 1126 S. 70th St., Milwaukee, Wis.
American Hydrozone Co., Inc., 10 E. 40th St., New York, N. Y.
Aquatic Chemical Laboratories, Inc., 118 E. 28th St., New York, N. Y.
Automatic Pump & Softener Corp., 1907 Kishwaukee St., Rockford, Ill.
Bird-Archer Co., 90 West St., New York, N. Y.
Builders Iron Foundry, 9 Codding St., Providence, R. I.
Continental Products Co., 1150 E. 222nd St., Euclid, O.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Dampney Co. of America, 1243 River St., Hyde Park, Boston, Mass.
Dearborn Chemical Co., 310 S. Michigan Ave., Chicago, Ill.
Duro Co., 537-40 E. Monument Ave., Dayton, O.
Electroaire Corp., 1455-57 W. Congress St., Chicago, Ill.
Elgin Softener Corp., Elgin, Ill.
Ferro-Nil Corp., 373 Fourth Ave., New York, N. Y.
Filtrine Mfg. Co., Inc., 53 Lexington Ave., Brooklyn, N. Y.
Graver Tank & Mfg. Co., Inc., 4809 Todd Ave., East Chicago, Ill.
Grief, Edward C., 64 West End Ave., Bogota, N. J.
Haering Co., Inc., D. W., 2308 S. Winchester Ave., Chicago, Ill.
Hagan Corp., 600 Bowman Bldg., Pittsburgh, Pa.
Hall Laboratories, Inc., 600 Bowman Bldg., Pittsburgh, Pa.
International Filter Co., 325 W. 25th Place, Chicago, Ill.
Metropolitan Refining Co., Inc., 50-23 23rd St., Long Island City, N. Y.
Mutual Chemical Co. of America, 270 Madison Ave., New York, N. Y.
National Aluminate Corp., 6621 W. 66th Pl., Chicago, Ill.
Oakite Products, Inc., 22 Thames St., New York, N. Y.
Ozo-Ray Process Corp., 400 N. Sangamon St., Chicago, Ill.

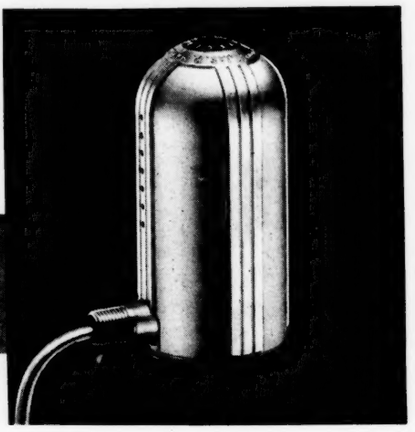
Use a "HOUSE BROKEN" air valve

ALL the world abhors a spitting air valve. Today Marsh Valves have even outdone their own great record of stopping the spitting and spurting in its tracks. This is particularly true of *Marsh Airliners*. A design as modern as tomorrow—separate delayed-drainage float chamber and ingenious baffle plate—stop the spurting under all conditions; something that has never before been so fully accomplished.

The same basic features are also found in the new popular priced Marsh "Airovent"—a valve that is second only to the "Airliner". Both "Airliners" and "Airovents" are available either with or without vacuum check and with selective venting adjustment.

Right down the line Marsh Venting Devices have more of everything — more beauty, precision, on-the-job utility, downright dollar value.


VENTING ADJUSTMENT SELECTOR
VENTING ADJUSTMENT
LARGE INTERNAL PORT MEANS HIGH VENTING CAPACITY
POWERFUL BELLOWS (D) FOR TIGHT VACUUM SEAL
MULTI-PORT DESIGN
BAFFLE PLATE (A) DEFLECTS SPRAY INTO FLOAT CHAMBER
SEPARATE FLOAT CHAMBER (B)
DRAIN (C)
THERMOSTATIC ADJUSTMENT (FACTORY SEALED)
THERMOSTATIC DIAPHRAGM



ASK for the new (June 1) Condensed Catalog covering the full line in highly convenient form.

JAS. P. MARSH CORPORATION
2089 Southport Avenue, Chicago, Illinois

MARSH

RADIATOR AIR VALVES
The oldest manufacturer — the newest ideas

Permutit Co., The, 330 W. 42nd St., New York, N. Y.
R. U. V. Engineering Corp., 110 E. 42nd St., New York, N. Y.
Red Jacket Mfg. Co., Davenport, Ia.
Refinite Corp., Refinite Building, Omaha, Nebr.
Research Products Corp., 1011-1015 E. Washington Ave., Madison, Wis.
Scaife & Sons Co., Wm. B., 26 Ann St., Oakmont, Pa.
Solvay Sales Corp., 42 Rector St., New York, N. Y.
Uniflow Mfg. Co., E. Lake Rd., Erie, Pa.
Vinco Co., Inc., The, 305 E. 45th St., New York, N. Y.
Warlo Corp., 330 W. 42nd St., New York, N. Y.
Water Refining Co., 1123 Barthold, Ft. Wayne, Ind.

WATER VALVES

(See Valves, Steam and Water)

WEATHER COMPENSATED CONTROLS

(See Controls, Weather Compensated)

WELDING FITTINGS

(See Fittings, Welding)

WHEELS, BLOWER

Advance Aluminum Castings Corp., 2742 W. 36th Pl., Chicago, Ill.
Air Controls, Inc., 9205 Detroit Ave., Cleveland, O.
American Blower Corp., 6000 Russell St., Detroit, Mich.
Autovent Fan & Blower Co., 1811-27 N. Kostner Ave., Chicago, Ill.
Bayley Blower Co., 1817 S. 66th St., Milwaukee, Wis.
Bishop & Babcock Mfg. Co., 4901 Hamilton Ave., Cleveland, O.
Bros Boiler & Mfg. Co., Wm., Nicollet Island, Minneapolis, Minn.
Brundage Co., 514 N. Park St., Kalamazoo, Mich.
Buffalo Forge Co., 171 Mortimer St., Buffalo, N. Y.
Champion Blower & Forge Co., Harrisburg Ave. and Charlotte St., Lancaster, Pa.
Clarage Fan Co., Porter St., Kalamazoo, Mich.
Economy Electric Mfg. Co., 4606 W. 21st Pl., Chicago, Ill.
Hastings Air Conditioning Co., Inc., Box 481, 615 W. South St., Hastings, Nebr.
Jaden Mfg. Co., F., Golden Rod Products, Hastings, Nebr.
Janette Mfg. Co., 556 W. Monroe St., Chicago, Ill.
Lau Blower Co., 2001 Home Ave., Dayton, O.
New York Blower Co., 3155 Shields Ave., Chicago, Ill.
Palmer Mfg. Corp., Phoenix, Ariz.
Peerless Electric Co., 3021 W. Market St., Warren, O.
Schwitzer-Cummins Co., Fan St., Indianapolis, Ind.
Sturtevant Co., B. F., Damon St., Hyde Park, Boston, Mass.
Torrington Mfg. Co., 70 Franklin St., Torrington, Conn.
Trane Co., The, La Crosse, Wis.
U. S. Air Conditioning Corp., 2101 Kennedy St., N. E., Minneapolis, Minn.
Utility Fan Corp., 2528 Santa Fe Ave., Los Angeles, Cal.
Viking Air Conditioning Corp., 9500 Richmond Ave., Cleveland, O.
Western Blower Co., 1800 Airport Way, Seattle, Wash.

WINDOW FAN—FILTERS

Ad-Leo Co., Inc., 825 S. Wabash Ave., Chicago, Ill.
Airgard Mfg. Co., 609 N. La Salle St., Chicago, Ill.
American Air Filter Co., Inc., 107 Central Ave., Louisville, Ky.
Amirton Co., 60 E. 42nd St., New York, N. Y.
Berger Mfg. Div., Republic Steel Corp., 1038 Belden Ave., Canton, O.
Burrowes Corp., 70 Free St., Portland, Me.
Carrier Corp., 302 S. Geddes St., Syracuse, N. Y.
Coppus Engineering Corp., 374 Park Ave., Worcester, Mass.
Davies Air Filter Corp., 390 Fourth Ave., New York, N. Y.
Economy Electric Mfg. Co., 4606 W. 21st Pl., Chicago, Ill.
Emerson Electric Mfg. Co., 1847 Washington Ave., St. Louis, Mo.
General Refrigeration Div., Yates-American Machine Co., Beloit, Wis.
Ilg Electric Ventilating Co., 2850 N. Crawford Ave., Chicago, Ill.
Jaden Mfg. Co., F., Golden Rod Products, Hastings, Nebr.
Kaiser Co., H. S., 3336 Franklin Blvd., Chicago, Ill.
Kauffman Air Conditioning Corp., 4336 W. Pine Blvd., St. Louis, Mo.
Mellish & Murray Co., 1715 Carroll Ave., Chicago, Ill.
National Standard Air Products Co., 325 W. Huron St, Chicago, Ill.
Reed Unit-Fans, Inc., 811 St. Charles St., New Orleans, La.
Somers, Inc., H. J., 6063 Wabash Ave., Detroit, Mich.
Standard Air Conditioning, Inc., 50 W. 40th St., New York, N. Y.
Steamaire Co., Cincinnati, O.
Sturtevant Co., B. F., Damon St., Hyde Park, Boston, Mass.
Todd Air Conditioning Co., Inc., Bonner Springs, Kans.
U. S. Air Conditioning Corp., 2101 Kennedy St., N. E., Minneapolis, Minn.
Unified Air Conditioner Co., Torry Bldg., Duluth, Minn.
Utility Fan Corp., 2528 Santa Fe Ave., Los Angeles, Cal.

WINDOW VENTILATORS

Airgard Mfg. Co., 609 N. La Salle St., Chicago, Ill.
Allen Corp., 9767 Erwin Ave., Detroit, Mich.
American Coolair Corp., 3604 Mayflower St., Jacksonville, Fla.
Autovent Fan & Blower Co., 1811-27 Kostner Ave., Chicago, Ill.
Berger Mfg. Div., Republic Steel Corp., 1038 Belden Ave., Canton, O.
Carrier Corp., 302 S. Geddes St., Syracuse, N. Y.
Chelsea Fan & Blower Co., 370 W. 15th St., New York, N. Y.
Diehl Mfg. Co., Trumbull St., Elizabethport, N. J.
Holtum Mfg. Co., Freeport, Ill.
Lohman, Inc., Wm. J., 62 Ninth Ave., New York, N. Y.
Russell Co., F. C., 6535 Euclid Ave., Cleveland, O.
Staynew Filter Corp., 25 Leighton Ave., Rochester, N. Y.

WINDOWS

Heat Insulating Glass

Advance Insulating Co., Magee Bldg., Pittsburgh, Pa.
Chamberlin Metal Weather Strip Co., 1254 La Brosse St., Detroit, Mich.
Detroit Steel Products Co., 2250 E. Grand Blvd., Detroit, Mich.
Libbey-Owens Ford Glass Co., Nicholas Bldg., Toledo, O.
Russell Co., F. C., 6535 Euclid Ave., Cleveland, O.
Truscon Steel Co., 1315 Albert St., Youngstown, O.

WOOD PIPE

(See Pipe, Wood)

WROUGHT IRON PIPE

(See Pipe, Wrought Iron)

WROUGHT IRON SHEETS

(See Sheets, Wrought Iron)

ZONE CONTROL SYSTEMS

(See Systems, Zone Control)

ZONE CONTROLS

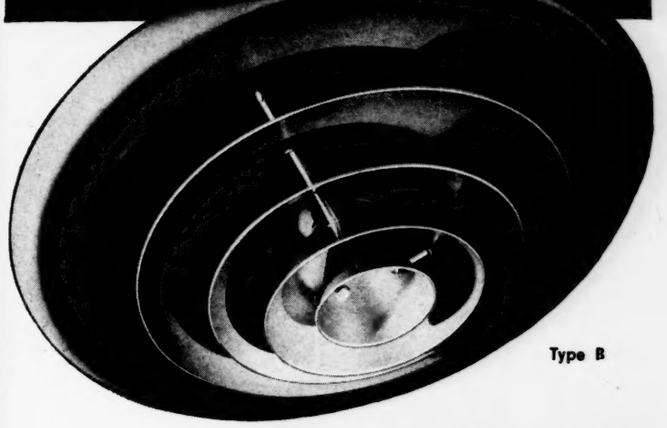
(See Controls, Zone)

ZONED HEATING SYSTEMS

(See Heating Systems, Zone Control)

ANEMOSTAT

HIGH VELOCITY, *Draftless* AIR DIFFUSERS



Type B

. . . WILL SOLVE YOUR AIR DISTRIBUTION PROBLEMS!

Securing satisfactory air distribution in large spaces, is one of the problems facing air conditioning and ventilating Engineers and Contractors in many of the industrial plants and extensions now going up. ANEMOSTATS readily solve this problem because they operate effectively in a wide range of velocities over a large floor area.

Furthermore, ANEMOSTATS often permit the use of **higher air velocities** and **greater temperature differentials,** with corresponding reduction in size of plant, duct work and number of outlets — all adding up to substantial savings in initial and operating costs.

For this reason, and because their patented and exclusive **design positively assures draftless air distribution and equalization of temperature, and hence humidity, throughout the areas they serve,** ANEMOSTATS are an essential part of every air conditioning and forced ventilating system.

ANEMOSTATS are also readily applied to existing systems. Thus, they open the door to more new business for contractors in the many factories in which air distribution is unsatisfactory.

GET FULL ANEMOSTAT DETAILS

Send today for descriptive literature. And remember, we offer full cooperation to the Engineer for working out the application of ANEMOSTATS to specific air distribution requirements. Write us.

ANEMOSTAT

CORPORATION OF AMERICA

Dep't G, 10 East 39th Street,
New York, N. Y.

Representatives in Principal Cities

"NO AIR CONDITIONING SYSTEM IS BETTER THAN ITS AIR DISTRIBUTION"

• ALPHABETICAL INDEX OF ADVERTISERS •

A

Ahlberg Bearing Co. 82
Airtherm Mfg. Co. 107
American Air Filter Co., Inc. 101
American Blower Corp. 97
American District Steam Co. 116
Anemostat Corporation of America 147
Armstrong Machine Works
Front Cover
Automatic Products Co. 143

B

Badger, E. B., & Sons Co. 99
Baldor Electric Co. 118
Barber-Colman Co. 3
Bell & Gossett Co. 71
Bethlehem Steel Co. ..... *
Buffalo Forge Co. 80-81

C

Carboloy Co., Inc. 148
Carey, Philip, Co. 108
Clarage Fan Co.....Inside Back Cover
Classified Advertisements 148
Curtis Refrigerating Mch Co. 91

D

Davis Regulator Co. 112
Delco Products Division General
Motors Corp. 14
Demuth, Charles, & Sons 133
Detroit Lubricator Co. ..... *
Dunham, C. A., Co. 110-111

E

Elgo Shutter & Mfg. Co. 130

F

Frick Co. 103

H

Healy-Ruff Co. 133
Heating & Ventilating 74

I

Illinois Engineering Co. 113
Illinois Testing Laboratories, Inc. 139
Industrial Press Co. 74

J

Johnson Service Co.
Inside Front Cover

K

Kisco Company, Inc. 109

M

Marlo Coil Co. 92
Marsh, Jas. P., Corp. 146
McDonnell & Miller.....Back Cover
McQuay, Inc. 4-5
Mercoid Corp. 137
Minneapolis-Honeywell Regulator
Co. 95

N

Nash Engineering Co. 18
National Association of Ice
Industries ..... *
National Tube Co. 8
Nelson, Herman, Corp., The 13

O

Owens-Corning Fiberglas Corp. .. 73

P

Pacific Steel Boiler Div. of United
States Radiator Corp. 87
Patterson-Kelley Co., Inc. 108
Penn Electric Switch Co. 76
Porter, H. W., & Co., Inc. ..... *

R

Randall Graphite Products Corp... 7
Research Products Corp. 127
Ric-wiL Co. 10

S

Sarco Co., Inc.....Insert bet. 10-13
Somers, H. J., Inc. 133
Spraying Systems Co. 130
Staynew Filter Corp. 6
Sterling, Inc. 83
Sterling Pump Corp 121
Superior Sheet Steel Co. 129

T

Todd Combustion Equipment, Inc.,
Div. of Todd Shipyards Corp. ... *
Torrington Mfg. Co. 93
Trane Co. 15

U

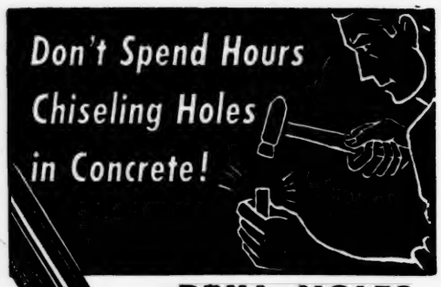
United States Air Conditioning
Corp. 132
United States Radiator Corp. 87
United States Steel Corp.
Subsidiaries 8

W

Wagner Electric Corp. 75
Want Advertisements 148
Webster, Warren, & Co. 16
White-Rodgers Electric Co. 9
Wing, L. J., Mfg. Co. 141
Worthington Pump & Mchy. Corp. 85

Y

Yarnall-Waring Co. 105-125-132
Young Radiator Co. 117



DRILL HOLES 50-75% FASTER!

Amazing new drill-point contains special metal harder than hardest steel. Goes through concrete, tile, slate, porcelain, etc., 50 to 75% faster. Drills cleaner, more accurate holes. Speeds up installation of expansion anchors. Saves your skilled time for more profitable work. Eliminates noisy hammering, monotonous chiseling. Doesn't splinter fragile work. No special equipment needed—use in any rotary drill. Get *your* share of those extra profits now possible. Send coupon for leaflet.

CARBOLOY COMPANY, INC.
DETROIT, MICHIGAN

FREE LEAFLET

Carboloy Co., Inc.
11107 E. 8 Mile Blvd., Detroit
Send free leaflet on Carboloy Masonry Drill-Points, for drilling 75% faster.
Name.....
Company.....
Street.....
City.....State.....

CARBOLOY
MASONRY DRILL-POINTS

CLASSIFIED ADVERTISING

Non-display advertisements 10 cents a word per insertion. (No charge for name and address.) Minimum charge $2.00. Payable in advance. Display advertisements—send for rates.

The New York Blower Company has openings in certain territories, within a 500 mile radius of LaPorte, Indiana, for successful and experienced representatives, for the sale of the full line of Fan and Blower Products of this old and well established blower company. This includes sales representation for Fans and Blowers, Industrial Unit Heaters, and Classroom Unit Ventilators. For further information address Sales Manager, The New York Blower Company, 3153 Shields Ave., Chicago, Ill.

REPRESENTATIVE WANTED—Boiler and radiator manufacturer of nationally accepted products desires Washington, D. C., representative to contact Government Department and take off heating quantities. Man with engineering background necessary. Reply giving age, experience, and references. Box No. 538, care HEATING & VENTILATING, 148 Lafayette St., New York.

WOULD BE INTERESTED in hearing from manufacturers of heating equipment interested in sales representation in Cincinnati, Ohio. A life resident, connected with the industry for twenty years, acquainted with the heating and plumbing trade, jobbers, builders, architects, etc. Character and habits subject to investigation. Box No. 540, care of HEATING & VENTILATING, 148 Lafayette St., New York.

AGENTS WANTED—Those doing a heating sales job now can increase their income by promoting Convectofin room-heating copper convectors specialized for one-pipe steam, hot water and vapor installations. Commodore Heaters Corp., 11 West 42nd St., New York.

WANTED—Well established middlewestern heating and air conditioning contractor has opening for reliable estimator. Give details of experience. Box 539, care HEATING & VENTILATING, 148 Lafayette St., New York.

AN AIR CONDITIONING PRIMER

By WILLIAM HULL STANGLE

What air conditioning is, what it can do, its technical fundamentals, methods of applying them and the types of equipment available.

234 pages, 213 illustrations, $2.50

Order Your Copy from

HEATING & VENTILATING - 148 Lafayette St., New York City

Recessed Venturi-flo

CEILING OUTLETS

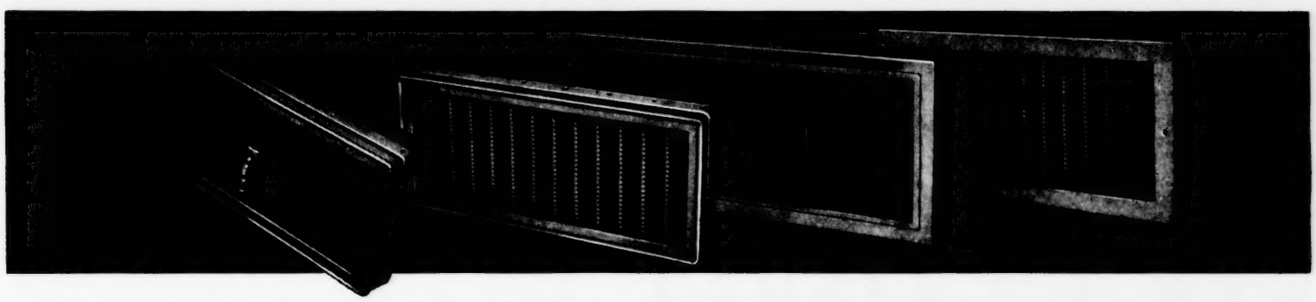
Showing how beautifully adaptable the VENTURI-FLO design is to this type of cove lighting. Standard VENTURI-FLO-LITE units, with additional illumination units above the rim, are used in the installation shown here with outstanding esthetic and engineering success.

Draftless Air Distribution

VENTURI-FLO Ceiling Outlets have proved their ability, in exacting and scientifically-controlled tests, to provide uniform, draft-free air distribution with greater aspiration, higher air velocities, and a lower noise level.

uni-flo

GRILLES *and* REGISTERS



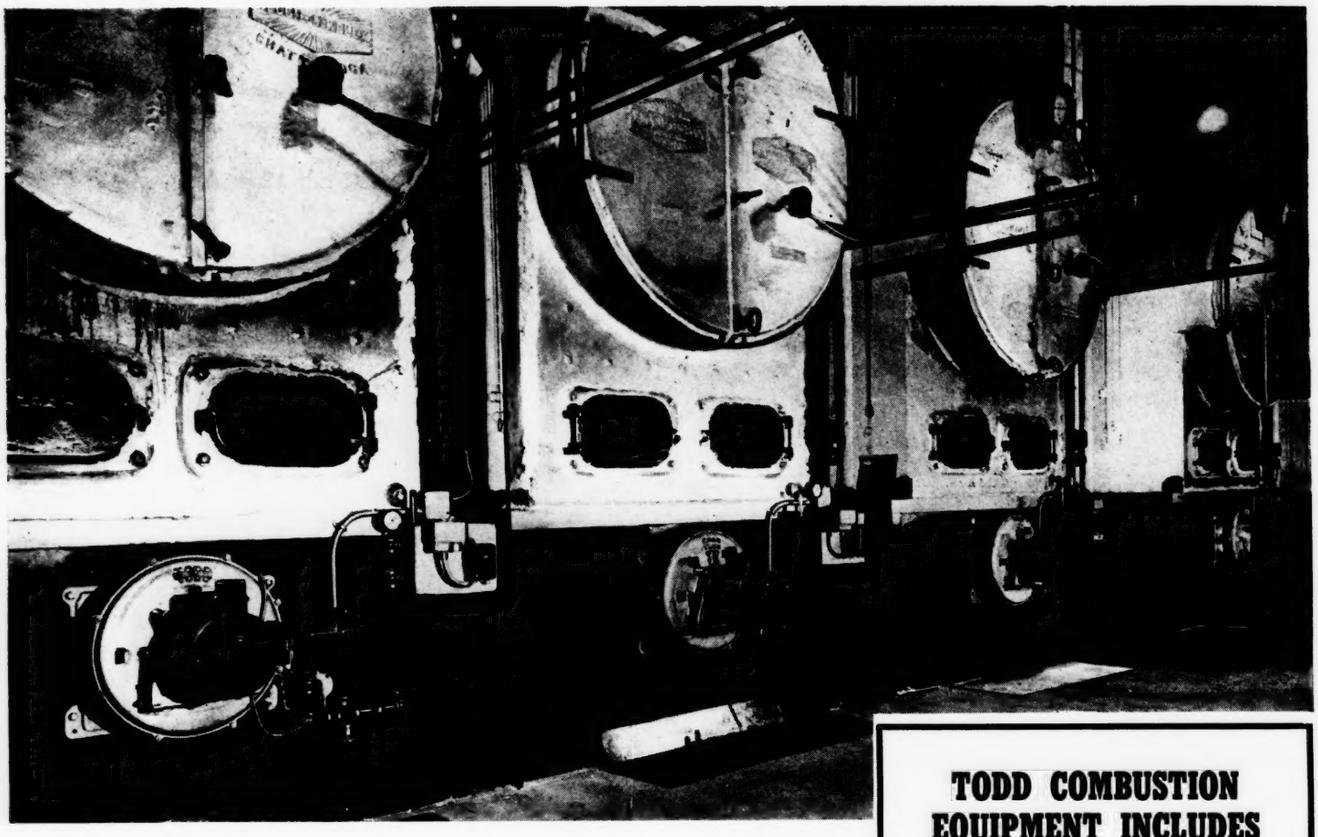
For sidewall outlets, the UNI-FLO line of Grilles and Registers offers many advantages. Correct air distribution can be accurately planned with a positive guarantee of satisfaction. Directional diffusing-fin core construction assures a uniform flow throughout the room. Low noise level permits use of higher air velocities, and thorough diffusion permits greater air temperature differentials. You can do a better job of controlling air supply with UNI-FLO Engineered Air Distribution methods. Write for further details.

BARBER-COLMAN COMPANY

ROCKFORD • ILLINOIS

HEATING & VENTILATING, *formerly* HEATING & VENTILATING MAGAZINE, published monthly by THE INDUSTRIAL PRESS, 148 Lafayette Street, New York, N. Y., U.S.A. Subscription rates: United States and Canada, $2.00: Foreign, $3.00. Single copies, 30 cents. Vol. 37, No. 12, December, 1940. Entered as second-class matter, April 18, 1925, at the Post Office at New York, N. Y., under the Act of March 3, 1879.

There's high regard for TODD among experts in power and heat



DEALERS ... CONTRACTORS ... ENGINEERS ... AND USERS

have found that Todd oil and gas burning equipment can be depended upon to *do* the job—*whatever* the job!

Manufacturing a variety of units suitable for use with almost any type of liquid or gaseous fuel installation, Todd is able to meet requirements of practically every boiler plant.

Designed to provide utmost satisfaction per-fuel-dollar . . . to furnish, efficiently, heat or power whatever the demands . . . to fulfill all the varying needs in industrial and commercial use . . . the many types of Todd Combustion Equipment are constantly proving their effectiveness.

Consequently, dealers find Todd burners in demand. Contractors are enthusiastic. Engineers are quick to recommend them. Users express complete satisfaction!

TODD COMBUSTION EQUIPMENT INCLUDES

the following in Commercial and Industrial sizes

- Mechanical Pressure Atomizing Oil Burners both standard and Variable Capacity types.
- Horizontal Rotary Oil Burners.
- Oil Burning Air Registers for Natural, Assisted, Induced or Forced Draft.
- Inside Mixing Steam Atomizing Oil Burners.
- Combination Gas and Oil Burners.
- Oil Burning Galley Ranges.
- Oil Heating, Pumping and Straining Equipment.

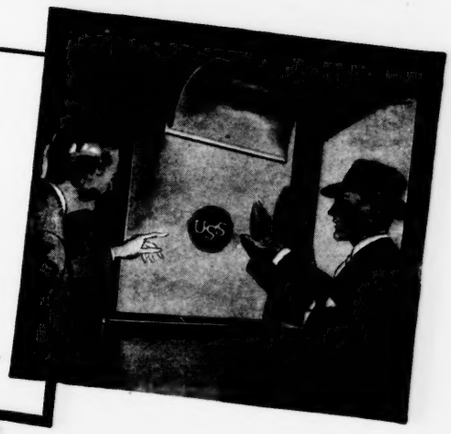
TODD COMBUSTION EQUIPMENT, INC.

(*Division of Todd Shipyards Corporation*)

601 West 26th Street, New York City

NEW YORK MOBILE NEW ORLEANS GALVESTON SEATTLE BUENOS AIRES LONDON

Can furnaces and duct work last the life of a building?



This chart compiled from inspection reports of the Committee on Corrosion of Iron and Steel, A.S.T.M. Proceedings 1937, shows results of tests carried on at Annapolis, Md. from 1916 to 1936. After 21 years' exposure, 91% of COPPER STEEL sheets remained "sound" (unperforated) Other materials were decidedly inferior.

YES—if they are built of U·S·S Galvanized Copper Steel! And surprising as it may seem, it costs less than a dollar more in the average home to build the duct work of this *longer lasting* metal. While plain galvanized steel gives good service in normal usage, for humidified air systems, the extra rust resistance of U·S·S Copper Steel is needed.

Look at the corrosion chart shown here. Various types of iron and steel commonly used for duct work were tested for 21 years in the open air. Copper Steel proved itself vastly superior. It has 2 to 3 times the rust resistance of plain steel or pure iron.

U·S·S Galvanized Copper Steel gives you *plus* selling value. Building owners immediately see the value of steel with double rust resistance—especially for damp locations.

Write for our booklet on U·S·S Copper Steel. We'll gladly send you complete information.

When duct work carries humidified air, there's always danger from rust. By building with U·S·S Galvanized Copper Steel you can provide two to three times the resistance to atmospheric corrosion.

GALVANIZED COPPER STEEL SHEETS

CARNEGIE-ILLINOIS STEEL CORPORATION, *Pittsburgh and Chicago*
COLUMBIA STEEL COMPANY, *San Francisco*
TENNESSEE COAL, IRON & RAILROAD COMPANY, *Birmingham*

Scully Steel Products Company, Chicago, *Warehouse Distributors*
United States Steel Export Company, New York

UNITED STATES STEEL

Sell architects and owners on the jobs you do with

BETHLEHEM STEEL SHEETS

Stepped-up activity throughout the entire field of residential construction points the way toward a substantial increase in your own business. You'll find that right now is an excellent time to approach the architects, builders and home owners in your neighborhood, to sell them on sheet metal jobs with Bethlehem Steel Sheets.

You'll find it easy to convince prospects that steel is an ideal modern building material when you point out that it's strong, light, durable, firesafe and termite-proof. Here's a partial list of the many jobs you can handle profitably with ductile, uniform Bethlehem Steel Sheets, black and galvanized:

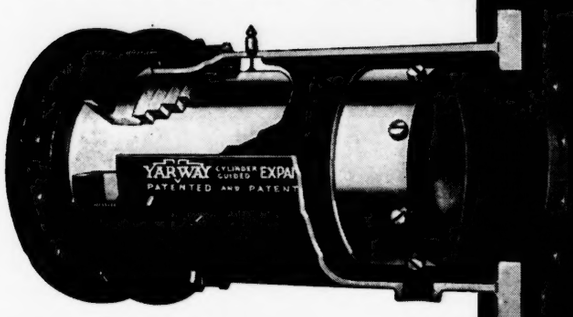
Ductwork, Fire Doors, Flues, Furnace Pipe, Kick and Push Plates, Metal Ceilings, Partitions, Radiator Shields, Roofing and Siding, Table Tops, Ventilators, Window Sills and Frames.

Bethlehem Steel Sheets make good workmanship easier. They respond readily to bending, seaming, soldering, riveting and welding operations. They are uniform in quality, accurate in gage and size.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY

CYLINDER-GUIDED FOR TROUBLE-FREE SERVICE

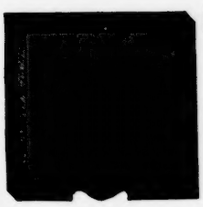


Made in single or double end types with or without base.

YARWAY
EXPANSION JOINTS

Welded Steel construction. Alemite lubrication. Diameter no larger than pipe flange... Outside cylinder guide design prevents abrasive sediment from cutting the sleeve. Write for catalog EJ-1904, which describes both Gland-Pakt and revolutionary Gun-Pakt (packed under pressure) types.

YARNALL WARING COMPANY, Philadelphia
104 MERMAID AVENUE



Make the first cost the last cost!

Where Somers Hair Spun Glass Filters are installed as original or replacement equipment there's an end to the cost. Somers Filters are washable, odorless, non-absorptive, do not rot, and are practically indestructible.

Dust, dirt, pollen and detritus in the air stream effectively removed with minimum back pressure. No adhesives required.

SOMERS HAIR GLASS FILTER

Somers Filters may be cleaned easily by using the stream from an ordinary water hose (at city pressures) pinched to obtain a spray effect.

For complete details and prices, write giving the c.f.m. per unit and dimensions of present master holding frame. A few choice territories are available for representatives. Full particulars on application.

H. J. SOMERS, INC., 6065 WABASH AVE., DETROIT, MICH.

ECLIPSE SEAMLESS FLEXIBLE METAL HOSE

Close Pitch

Normal Pitch

Of seamless, all metal, parallel corrugated, armored construction, in various alloys with renewable type fittings approved for the conveyance of non-solids and non-abrasives in *Aviation, Automotive, Marine, Heating, Air Conditioning, Mining, Power Generation, Plastic and Textile applications* wherein conditions of flexing and expansion between delivering and receiving connections exist. Also available for shielding and exhaust applications.

"Listed by Underwriters' Laboratories"

METAL HOSE DEPARTMENT
ECLIPSE AVIATION, BENDIX, N. J.
Division of Bendix Aviation Corporation

For the Sake of

FUEL ECONOMY and GREATER TENANT COMFORT

Install... **STERLING Thermotrol**
(Individual Radiator Controls)

Yes, you can SAVE FUEL and keep ALL your tenants more satisfied with STERLING THERMOTROLS! With a THERMOTROL on every radiator, your tenants may have the exact temperature that is desired. They enjoy the steady, uniform, healthful heat that they like—WITHOUT WASTEFUL OVERHEATING.

THERMOTROLS are easy to install and INEXPENSIVE. Experience of over thirty years in hundreds of buildings proves that they PAY FOR THEMSELVES IN FUEL SAVING ALONE.

STERLING THERMOTROLS are made for exposed or concealed radiators . . . on two-pipe steam, vapor, and vacuum heating plants, and one- or two-pipe hot water systems.

Free
60-DAY ROOM TRIAL

STERLING, INC.
3732-L NORTH HOLTON ST., MILWAUKEE, WISCONSIN

TEAR OFF THIS COUPON

I'd like to give THERMOTROLS a 60-day "Room Trial." Send.... THERMOTROLS for .... Exposed ....Concealed Radiators. I understand that these will be charged for 60 days, and can be returned for credit within that time if individual room temperatures are not controlled satisfactorily.

Name .....
Address .....
City ..... State .....

All About Arc Welding

THE NEW HANDBOOK
YOUR GUIDE TO PROGRESS

★ Here are the results of twenty years' fact-finding on the part of a staff of two hundred arc welding experts contacting every industry throughout the world. The new 6th edition "Procedure Handbook of Arc Welding Design and Practice" contains up-to-date facts about all aspects of arc welding and its many profitable applications, compiled and edited for quick reference and easy understanding. This authoritative reference guide will enable you to keep abreast of this fast-growing industry for personal advancement and profit. You cannot afford to be without this valuable new Handbook.

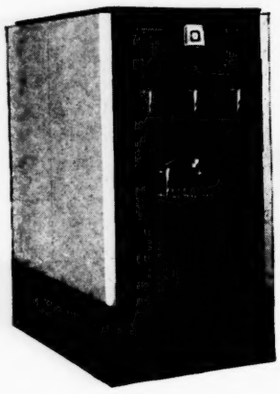
Complete in every detail. In eight parts—(1) Welding Methods and Equipment. (2) Technique of Welding. (3) Procedures, Speeds and Costs. (4) Weld Metal and Methods of Testing. (5) Weldability of Metals. (6) Machine Design. (7) Structural Design. (8) Actual Applications.

Recognized throughout the world as the authentic reference book on arc welding. More than 90,000 copies of first five editions have been sold. 6th edition is an entirely NEW Handbook, containing important new information. Written clearly. Well indexed for quick reference. Size 6" x 9" x 1⅝"—ideal for use in office, shop or school. Printed on fine paper. Bound in semi-flexible simulated leather—gold embossed.

Published by THE LINCOLN ELECTRIC CO.

For Sale by The Industrial Press, 148 Lafayette St., New York

No wonder stoker men are so enthusiastic in their praise of the *New* SMITH MILLS "25" Boiler. For automatic coal firing in large homes and small commercial buildings it's in a class by itself — a revelation in faster heating, higher efficiency and greater economy



New SMITH MILLS "25"

Famous Mills Vertical water tube construction with its high proportion of direct heating surface insures more heat from the fuel dollar. Ease of installation helps to assure low first cost. Cast-iron construction adds years of dependable service.

●

Catalog . . . gives complete information . . . Write for it.

The H. B. SMITH CO., Inc.
WESTFIELD • MASSACHUSETTS
Boston New York Philadelphia

SMITH
Since 1853
MOST FAMOUS NAME IN HEATING

ALPHABETICAL INDEX OF ADVERTISERS

A

Alter, Harry, Co. 70
American Air Filter Co., Inc. 7
American District Steam Co. 65
Anemostat Corp. of America ..... *
Armstrong Machine Works ..... *
Automatic Products Co. 67

B

Badger, E. B. & Sons, Co. ..... *
Barber-Colman Co. 3
Bethlehem Steel Co. 6
Bishop & Babcock Mfg. Co. ..... *
Buffalo Forge Co. ..... *

C

Carey, Philip, Co. ..... *
Carbondale Div....Inside Front Cover
Carnegie-Illinois Steel Corp. 5
Clarage Fan Co. ..... *
Classified Advertisements 70
Columbia Steel Co. 5

D

Demuth, Charles & Sons ..... *
Dunham, C. A., Co...Inside Back Cover

E

Eclipse Aviation, Div. of Bendix Aviation Corp. 69
Elgo Shutter & Mfg. Co. ..... *

F

Frick Co. ..... *

I

Illinois Engineering Co. ..... *
Illinois Testing Laboratories, Inc. 65

J

Johnson Service Co. ..... *

M

Marlo Coil Co. 68
Marsh, Jas. P., Corp. 63
McDonnell & Miller ..... *
McQuay, Inc. 61
Minneapolis-Honeywell Regulator Co. ..... *

N

Nash Engineering Co. 10
National Tube Co. ..... *

O

Owens-Corning Fiberglas Corp.... .. *

P

Patterson-Kelley Co., Inc. 65
Plandaire, Inc. ..... *
Porter, H. W., & Co., Inc. 66

R

Refrigeration Equipment Manufacturers Assn. 66
Research Products Corp. ..... *
Ric-wiL Co. 63

S

Sarco Company, Inc. ..... *
Smith, H. B., Co., Inc. 70
Somers, H. J., Inc. 69
Staynew Filter Corp. ..... *
Sterling, Inc. 69
Sterling Pump Corp. ..... *
Superior Sheet Steel Co....Back Cover

T

Tennessee Coal, Iron & Railroad Co. 5
Todd Combustion Equipment, Inc., Div. of Todd Shipyards Corp.... 4
Torrington Manufacturing Co. ... *
Trane Company ..... *

U

United States Steel Corp. Subsidiaries 5

W

Wagner Electric Corp. ..... *
Want Advertisements 70
Webster, Warren, & Co. 8
Wing, L. J., Mfg. Co. ..... *
Worthington Pump & Mchy. Corp. Inside Front Cover

Y

Yarnall-Waring Co. 65-69
Young Radiator Co. ..... *

*Advertisement appeared in preceding issue.

CLASSIFIED ADVERTISING

Non-display advertisements 10 cents a word per insertion. (No charge for name and address.) Minimum charge $2.00. Payable in advance. Display advertisements—send for rates.

FREE SEND FOR THIS AMAZING BOOK

Mr. Dealer: Every day, more and more people are buying humidifiers. Write today for full information about the HUMIDOME, America's finest portable electric humidifier. *Low priced.*

THE HARRY ALTER CO.
1738 So. Michigan Ave., Chicago, Ill.

ENGINEER WANTED. Large manufacturer of automatic control equipment has an opening for engineer under thirty years of age. Previous training in heating and ventilating desirable but not essential. Address Box No. 543, care HEATING & VENTILATING, 148 Lafayette St., New York.

WANTED—Young engineer who has had experience in the design of fans and blowers. Box No. 547, HEATING & VENTILATING, 148 Lafayette St., New York.

WANTED SALES MANAGER. One of leading manufacturers of unit heaters, copper convector type radiator, blast heaters, air conditioning units and parts, and cooling coils has opening for thoroughly experienced sales manager who must be able to control, coordinate and stimulate the sales efforts of 50 independently owned offices. Applicant must have thorough knowledge of heating, cooling, and air conditioning and of sales and advertising problems in this field; must have record of achievements. Salary commensurate. Apply, stating fully your experience, education, etc., to Box No. 545, care HEATING & VENTILATING, 148 Lafayette St., New York.

WANTED—Good Second Hand Unit Heater of Approximately 5000 to 6000 E.D.R. Capacity. State Price, Voltage, Location, etc. Box 546, care HEATING & VENTILATING, 148 Lafayette St., New York.

Send for the ELECTRO-MATIC Story

USE THE COUPON!

The Electro-Matic Filter which collects air borne dust, soot, and smoke electrically and mechanically is the outstanding air cleaning development of the decade. How it works, construction blueprints, efficiency tables, and the interesting story behind its development and application are given in the new Electro-Matic bulletin just issued. A copy will be sent you free, without obligation. If you have an air cleaning problem, this book would be of great value to you. Please use the coupon.

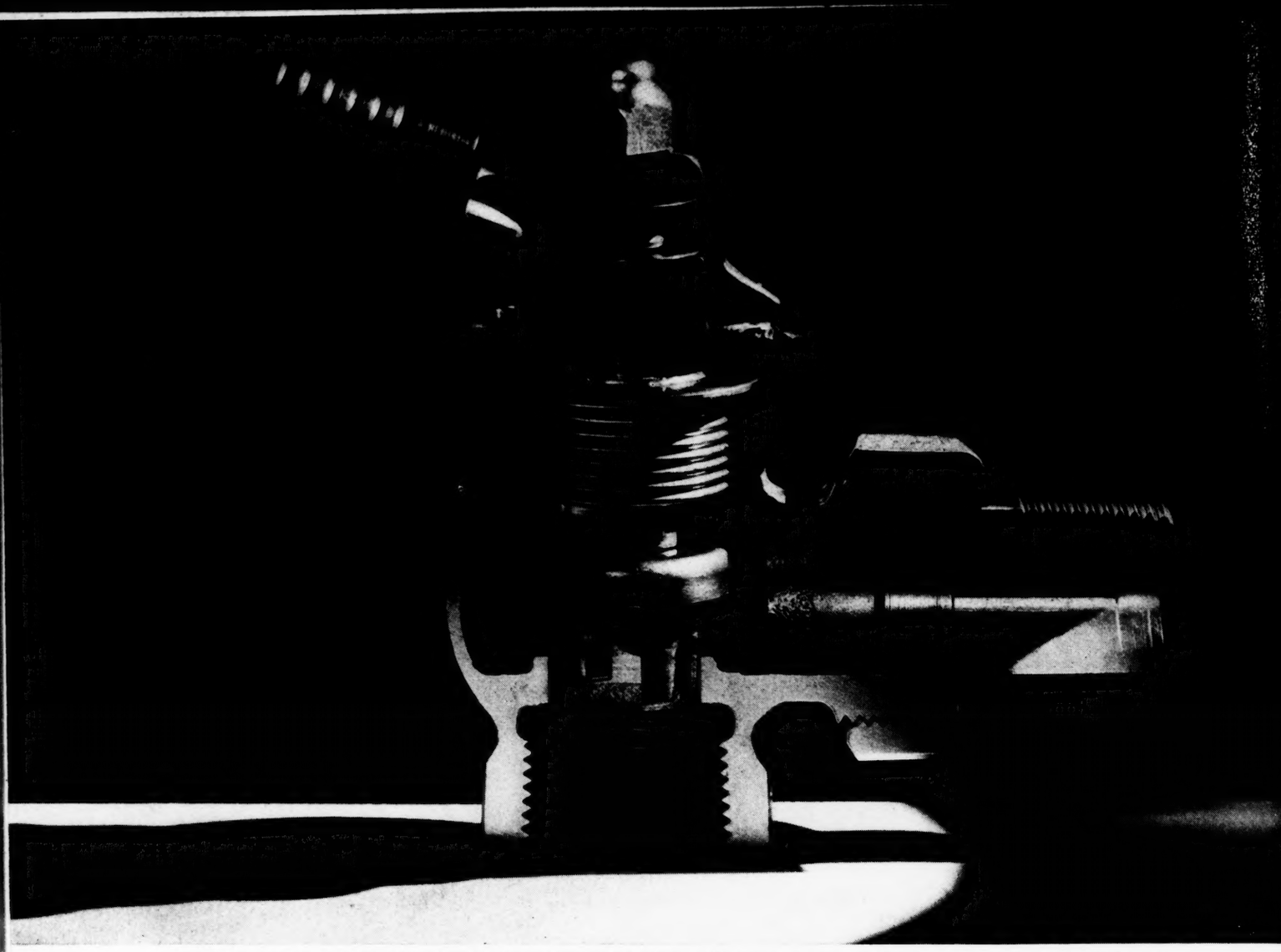
AMERICAN AIR FILTER CO., INC.
635 Central Ave., Louisville, Kentucky

Gentlemen:

Please send me without cost or obligation your new bulletin on the Electro-Matic self-cleaning air filter.

Name .....
Firm .....
Address .....
City ..... State .....

COLLECTS DUST, SOOT, SMOKE ELECTRICALLY



Webster Sylphon Packless Radiator Supply Valve . . . Genuine Fulton Sylphon Bellows provides the packless feature. Steam brass body, nickel plated. Renewable composition disc in sturdy brass retainer. Composition packing alignment guide ring. Bonnet with integral dial graduated from shut to full open. Quick-opening, non-rising stem. Angle, left-corner, right-corner, straightway single union and straightway double union body models with bakelite wheel, lever lockshield, chain wheel, long stem or extension handles. In ½", ¾", 1", 1¼" and 1½" sizes. For steam heating service.

"—Sylphon Bellows packless"

A genuine Fulton Sylphon Bellows in this Webster Radiator Supply Valve meets all requirements calling for "bellows packless" construction. The valve stem structure is completely encased in a seamless Sylphon Bellows. No adjustment . . . no "taking up" of packing . . . no "packing leaks" will occur during the lifetime of this valve.

Other features of this series of Webster Radiator Supply Valves are standardized with the "commercial packless" Webster Type WB Radiator Valves.

In fact, there is a close family resemblance in all Webster Steam Heating apparatus. This is a natural result of the Webster policy of building equipment coordinated for results.

In addition to radiator supply valves, Webster Equipment includes traps of all types, concealed Webster System Radiators, Webster Moderator and Hylo central steam heating controls—all combined to assure modern steam heating service, available through representatives in 65 principal cities.

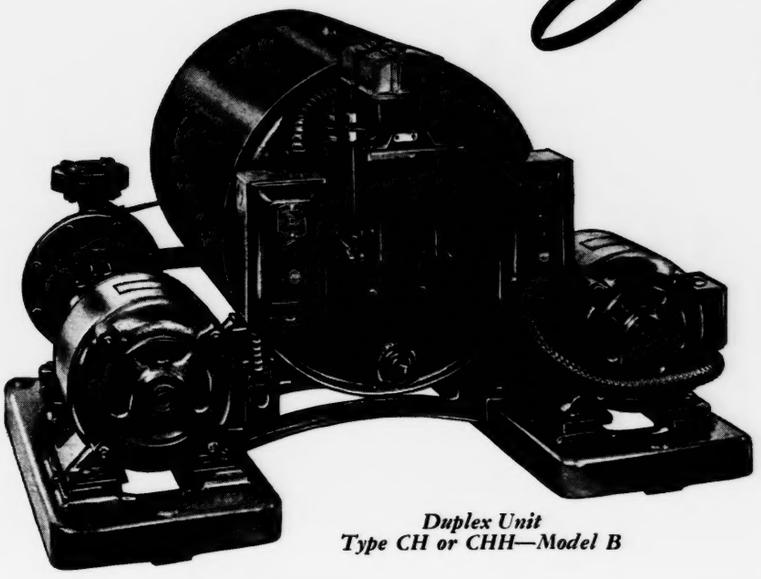
WARREN WEBSTER & COMPANY, CAMDEN, N. J.
Pioneers of the Vacuum System of Steam Heating :: Est. 1888
Representatives in 65 principal cities : : Darling Bros., Ltd., Montreal, Canada

If you want to see a sample, handle it and check for yourself on quality, write us today. The nearest Webster Representative will gladly show you this latest Webster Radiator Supply Valve.

–since 1888
Webster
Systems of Steam Heating

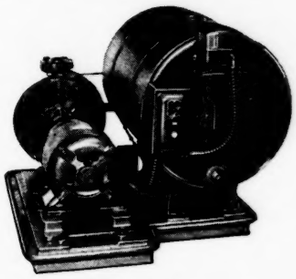
"You can put it in and *forget it*"

DUNHAM CONDENSATION PUMPS AND RECEIVERS

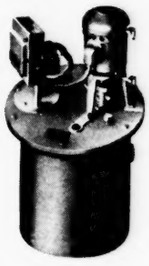


Duplex Unit
Type CH or CHH—Model B

Single Unit, Type CH or CHH—Model B



Single Unit
Type CH—Model A



Type CV

You put in a Condensation Pump *for what it will do*—and *for how long* it will do it. You buy the pump for its service—and service, years of it, is what you get in Dunham Condensation Pumps and Receivers.

For years of service, Dunham Pumps are designed, from the base up, on the soundest known engineering principles. For years of service they are manufactured carefully, painstakingly, with special provision where corrosion or wear normally occurs in pumps. By the application of experience gained from thousands of pumps in operation, Dunham Pumps are built to take it. To voice the oft-repeated opinions of regular Dunham Pump users, "You can put it in and forget it!"

There is a Dunham Pump and Receiver, single or duplex, with load and pressure characteristics built to fit every job. For comprehensive bulletins on specific sizes, please address Pump Division—C. A. Dunham Company, 450 East Ohio Street, Chicago.

Consult the Architect for Good Design and the Consulting Engineer for Mechanical Equipment

C. A. DUNHAM COMPANY
450 EAST OHIO STREET, CHICAGO, ILLINOIS

COPPER-STEEL
SUPERIOR GALVANIZED

THE SUPERIOR SHEET STEEL CO. - CANTON, O. - COPPER LADEN STEEL SHEETS

COPPERIOR

For sheet steel work of the most permanent kind Superior Copperior is extensively used. The durability of these sheets is due first to the copper steel base, which tests show possesses 2 to 3 times greater resistance to rust than steel used in ordinary sheets, and second to their SUPERIOR GALVANIZING.

Aside from the greater durability of Superior Copperior sheets, under adverse conditions, these sheets conform to the same high standards of all Superior sheets for uniformity of temper and workability. Another advantage that many sheet metal workers like is the uniform bright spangles of these and other Superior Galvanized sheets. Superior Copperior sheets are available from Superior jobbers in principal cities.

THE SUPERIOR SHEET STEEL COMPANY, Canton, Ohio
Division of Continental Steel Corporation, U.S.A.

SUPERIOR